

**USAGE OF ELECTRONIC INFORMATION SOURCES
AND SERVICES BY TEACHERS AT SMART SCHOOLS
IN SELANGOR: TOWARDS DEVELOPING DIGITAL
SCHOOL RESOURCE CENTERS.**

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ABSTRACT

The purpose of this study was to assess the level of usage of electronic information sources and services by Malaysian Smart Schools teachers in the teaching and learning process. The study examined the level of the teachers' ICT skills and types of electronic information sources being used. This study also ascertained the need for developing a digital school resource center, as well as highlighted the barriers in using electronic information sources in teaching and learning. The participants who are teachers of secondary Smart Schools in Selangor completed a questionnaire, with a 94.2% response rate. The study revealed that 55.5% of the respondents were not competent, 28.5% were moderately competent while only 16% were competent in ICT skills. A majority of them had a middle level of competency in operating software application and programming languages. The study also found that most of the respondents (54.1%) had never used electronic information sources in the teaching and learning processes due to constraints such as heavy teaching workload and lack of computer knowledge. These were also two major reasons considered as barriers that inhibit respondents' usage of electronic information sources in the Smart Schools. 34% of them used the electronic information sources once a month while 11.9% used them once a week in teaching and learning process. Although the integration of ICT in education is relatively low, this study found that there was a need for developing a Digital School Resource Center in the future. A majority of the respondents (93.9%) agreed that the current School Resource Center be digitized in this new millennium. This study provides potential useful information on the impact of the ICT integration in the Smart Schools Project towards setting up of a Digital School Resource Center.

ABSTRAK

Kajian ini bertujuan menilai tahap penggunaan sumber maklumat elektronik oleh guru-guru Sekolah Menengah Bestari Malaysia dalam proses pengajaran dan pembelajaran. Soal selidik yang dijalankan mengkaji tahap kemahiran ICT di kalangan guru-guru Sekolah Menengah Bestari Negeri Selangor melalui penggunaan sumber maklumat dan bahan elektronik bagi meningkatkan kaedah pengajaran dan pembelajaran. Kajian ini juga menentukan keperluan membangunkan pusat sumber sekolah digital dan mengenalpasti halangan utama penggunaan sumber maklumat dan bahan elektronik tersebut dalam proses pengajaran dan pembelajaran di sekolah. Jumlah responden sebanyak 94.2% yang menjawab soal selidik adalah terdiri dari guru-guru Sekolah Menengah Bestari Negeri Selangor. Hasil kajian tentang kemahiran ICT mendapati 55.5% responden tidak mahir, 28.5% separuh mahir manakala 16% sahaja yang sangat mahir dalam penggunaan ICT di sekolah-sekolah kajian. Sebilangan besar responden hanya memiliki kemahiran di peringkat pertengahan dalam penggunaan aplikasi software dan program bahasa komputer. Hasil kajian turut mendapati kebanyakan responden (54.1%) tidak pernah menggunakan sumber maklumat elektronik dalam proses pengajaran dan pembelajaran di sekolah kerana beban tugas yang berat, kurang kemahiran dan pengetahuan tentang komputer. 34% daripada responden menggunakan sumber maklumat elektronik ini sekali dalam tempoh sebulan manakala 11.9% responden menggunakannya sekali seminggu dalam proses pengajaran dan pembelajaran di sekolah. Walaupun integrasi ICT dalam pendidikan berada di tahap yang minimum, namun kajian ini menunjukkan adanya keperluan ke arah membangunkan pusat sumber digital di masa hadapan. Majoriti responden (93.9%) bersetuju bahawa pusat sumber sekolah yang sedia ada dijadikan pusat sumber digital dalam era milineum ini. Kajian ini memberikan maklumat berguna dan berpotensi dalam mewujudkan integrasi ICT bagi Projek Sekolah Bestari ke arah membangunkan Pusat Sumber Sekolah Digital.

“Ask a question and you’re a fool for three minutes; do not ask a question and you’re a fool for the rest of your life.” - (Chinese proverb)

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LIST OF ABBREVIATIONS

CDC	Curriculum Development Center
CDRI	CD ROM Interactive
CD-ROMs	Compact Disc-Read Only Memory
CIE	Computer in Education
EPRD	Educational Planning and Research Division
ETV	Educational Television
ICSS	Integrated Curriculum for Secondary Schools
ICT	Information Communication Technology
IT	Information Technology
KBKK	<i>Kemahiran Berfikir secara Kritis dan Kreatif</i>
MOE	Ministry of Education
MS	Microsoft
MSC	Multimedia Super Corridor
SED	State Education Department
SERC	State Education Resource Center
SRC	School Resource Center
SSIS	Smart School Integration Solution
SSMS	Smart School Management System
TLM	Teaching Learning Material

CHAPTER 1

INTRODUCTION

1.1 Background to the Study

Malaysia has a long-term vision, which will be achievable only with a technologically literate and critically thinking workforce prepared to participate fully in the global economy of the 21st century (Chan, 2001). “Vision 2020” which calls for sustained and productivity-driven growth, initiated in the early 1990s may be perceived as Malaysia’s first step into the Information Age and a globalised world. The country needs to build a world-class education system dedicated to producing a world-class workforce in order to enable Malaysia make a quantum leap towards an industrialised nation status and eventually into a knowledge economy (K-economy) (Adris et al., 2001). This is in line with the mission statement of the Ministry of Education: “To develop a world class quality education system which will realise the full potential of the individual and fulfil the aspirations of the Malaysian nation” (Ministry of Education Malaysia, 2001).

Efforts towards achieving the above mission and objective of creating an information-rich society should start in the schools. More efforts should be geared towards promoting a learning culture in our society, that is, learning to learn and lifelong learning to develop the ability to independently learn and utilise new knowledge and skills to meet changing needs (Halimah, 2004). The Government has focused its attention on the education sector to increase the information communication technology (ICT) literacy in order to reduce a digital divide among the young population. As a result, the use of personal computers and ICT for children was introduced at an early stage of their education as part of the school curriculum to harness and use information effectively.

As an attempt to support Malaysia's K-economy master plan, various agencies within the Ministry of Education conduct training. For instance, the Teacher Education Division handles the pre-service and in-service training of teachers, while the Institut Aminuddin Baki (IAB) conducts training for heads of schools and other school administrators. The Educational Technology Division, the Examinations Syndicate and also the Curriculum Development Centre conduct orientation courses. In addition, the State Education Departments, the State Educational Resource Centres, and the Teacher Activity Centres also conduct specialised short-term courses for teachers to be exposed to ICT literacy and the use of ICT in pedagogy (Chan, 2001).

The use of ICT in today's pedagogy will reflect the existence of electronic information sources thus requiring teachers to master certain skills in utilising electronic resources. These skills include knowledge of the database structure and instructions, which must be put into the computer courses to ease the use of electronic resources and its tools. Nowadays, teachers do not only use tablet PCs and portable laptops but together with scanners, CD burners, USB drives, digital cameras, PDAs, digital video and DVD players. Teachers may use desktop publishing, e-mail, World Wide Web, online programs and video conferencing to teach and it is no longer acceptable for them to be information or technology illiterate.

Ray and Day (1998) noted that ability to find and retrieve information effectively is a useful skill for positive and successful use of electronic resources as it provides more advantages compared to traditional print-based sources. Such advantages include easy access; information is obtained speedily, more varieties from electronic sources and more often updated than printed tools. The most important thing is electronic resources, through networking, can be delivered directly to the users anywhere and everywhere, not just only from the libraries.

1.2 The Malaysian Smart School Project

The application of ICT as an enabling tool in teaching and learning should be spread for wider coverage that cuts across all levels of education and regions (Halimah, 2004). This aims to change the education system from conventional learning and examination oriented culture to an electronic learning system or *e-learning*. In other words, the whole education system has to be ICT-enabled Smart Schools. In this context, the Malaysian Smart School is defined as a learning institution that has been systematically reinvented in terms of teaching-learning practices and school management in order to prepare our children for the information age (Smart School Flagship Application Blueprint, p.20). This Smart School initiative is one of the seven flagship applications that are part of Malaysian Multimedia Super Corridor (MSC) project. The Government of Malaysia aims to capitalize on the presence of leading-edge technology in schools. At the same time, such aims intend to transform its educational system in line with and in support of the national drive to fulfill the vision of 2020 (Smart School Conceptual Blueprint, p.9).

In order to guarantee the success of the conceptual model of teaching and learning, these Smart Schools require effective and efficient management of the resources and teaching-learning processes. In line with the above objectives, the Malaysian Smart School Project was launched in July 1997 to achieve the aims of the National Philosophy of Education and to foster the development of a workforce prepared to meet the challenges of the 21st century. This was done by creating a group of ninety schools pilot project in 1999 that served as the nucleus for the eventual nation-wide roll-out of Smart School concepts, materials, skills and technologies (Chan, 2001). This project was completed in December 2002 and beginning 2004, the smart school has been rolled out to another 300 schools. Towards the end, efforts include upgrading ICT infrastructure in these schools as well as those involved in the pilot project, enhancing the teaching-learning materials by developing courseware for nine additional subjects and spreading existing courseware to all schools.

1.3 Investment in Information and Communication Technology (ICT)

One of the major reasons for the widespread attention focused on technology in education today is the enormous financial investment being made in ICT as well as for the development of intellectual human capital in Malaysia. As our country is undergoing transformation into an ICT-driven and knowledge-based society, Halimah (2004) highlighted on the development of ICT in Malaysia and its relation to the development of human capital. She has reported under the Seventh Malaysia Plan (7MP, 1996-2000), and more so under the Eighth Malaysia Plan (8MP, 2001-2005), the Government had placed much emphasis on ICT utilisation during the implementation of policies and programs and the need to use this process as a mean of creating new technologies. The Federal Government development allocation and expenditure by sector during the 7MP, the expenditure in education and training was RM19.7 billion or 19.9% of the total development expenditure, and expanded to RM22.7 billion during the 8MP. This allocation showed a big jump in the expenditure for technical and vocational schools from RM404.9 million during the 6MP to RM756.6 million during the 7MP while the 8MP showed further increment to RM900 million (Source: 8th Malaysia Plan, 2001).

As reported in Bernama on June 2005, Prime Minister Datuk Seri Abdullah Ahmad Badawi said the Government was now in the midst of formulating the next five-year development plan, which is the Ninth Malaysia Plan (9MP, 2006 - 2010). The plan is important because it is at the midterm stage of realising to make the country a developed nation and to reach the objectives of Vision 2020. A special focus and efforts were also being given to develop the country's growth resources, apart from aspects such as bridging the divide between communities and regions as well as eradication of poverty. Furthermore, Bernama also reported that Education Minister Datuk Seri Hishammuddin Tun Hussein highlighted the steps that had been taken by the Ministry. It has to package and coordinate the various educational programmes for about 10,000 schools, 320,000 teachers and more than five

million students which were disjointed and were expected to be smoothed under the Ninth Malaysia Plan (9MP). (Source: Bernama, 5 June 2005).

In May 2005, New Straits Times reported that in five years time, all 10,000 schools nationwide will be smart schools while another 4,500 computer laboratories will be built to ensure the schools have adequate facilities for ICT. The capacity of the School-Net network will be upgraded from 1 Mbps to 2 Mbps and the teaching of Science and Mathematics in English will be strengthened. The move was in line with Datuk Seri Abdullah's intention to see all schools becoming more competitive and modern over time. He also mentioned that the Government would not build any more smart schools but will instead convert all national schools into smart schools. This is due to the fact that the conversion would be quicker and more cost-effective, adding that it would cost RM20 million to RM30 million to build a smart school. Some 4,500 schools are already equipped with computer laboratories, 99,000 computer units and 4,600 servers together with some 97,000 laptops and 70,000 LCD projectors. A total of 8,120 schools are connected to the broadband School-Net and around 14,000 television sets are in schools. (Source: New Straits Times, 7 May 2005).

In addition, Datuk Seri Hishammuddin mentioned in Bernama, reforms in the national education system will be implemented under the Tenth Malaysia Plan (10MP, 2011-2015). The implementation of the ICT was implemented separately, started with the Computer In Education (CIE) programme which involved the construction of computer laboratories together with the basic necessities. He said, besides the CIE, the use of ICT in the teaching and educational process has been expanded disjointedly such as the development of Smart Schools, the development of School-Net broadband infrastructure and finally the Teaching and Learning of Science and Mathematics in English (PPSMI) programme. However, Educational TV (ETV) was not listed as the ministry's ICT initiative

whereas the Ministry perceived the ICT initiative as a package in the Smart School programme which would take into consideration the implementation of all ICT initiatives involving CIE, Smart Schools, PPSMI as well as ETV. He also added that each expansion programme would be looked at in terms of three main aspects namely the hardware, software, inputs and teachers training. (Source: Bernama, 13 June 2005).

1.4 Problem Statement

Obviously, the government is serious about introducing technology to all schools in the shortest possible time, but the provision of hardware, software and technical expertise to schools is an expensive venture (Musa, 2002). Subsequently, teacher training in computer literacy is one of the major issues need to be addressed. Teachers across the curriculum should be trained efficiently, teaching materials should be developed effectively, appropriate networks should be installed properly and a supporting infrastructure has to be in place to ensure that the hardware, software and educational components are all able to function constantly. One of the approaches adopted is to train teachers through in-service programs as instructors for the Smart School concept.

In addition, computer literacy programs must be complemented by parallel efforts in promoting information literacy to teach the relevant information-related skills and more focus should be on the access and effective use of electronic information sources (Teh, 1996). As such, schools have been encouraged to connect to the Internet because students will not only learn through teachers and books but will use the Internet to source a variety of information from all over the world. Moreover, multimedia courseware, presentation facilities and e-mails are required in classroom settings, while school resource centers and computer laboratories are the resources, which will facilitate learning and teaching processes.

The fundamental role and function of the school library should be further enhanced for information-based skills teaching and learning. So far, the development of school libraries has largely been concerned with the provision of more books, other types of information sources, particularly audiovisual and information-related services. In fact, school library should be a center for information-related activities through the implementation of a school automated library system. In this context, Teh (1996) emphasized that the education ICT strategy must embody a long-term plan to automate the school libraries. The active and planned use of the library to support and more importantly, help to develop teaching and learning makes it more appropriately to be digitized in this new millennium. The transition of school library into a digital school resource center suggests more advanced development role and provides more than just a wide range of resources and services. The successful development of the digital SRC will, however, be dependent on support provided by the school management as well as the capabilities of the teacher librarian and other teachers to integrate ICT in smart pedagogy.

Unfortunately, teachers lack the confidence to teach in technology-supported classroom environments. Many teachers were having problems in the building of smart education even though they had been trained earlier. A majority of the teachers had basic knowledge and skills in computers, but lack in-depth knowledge of other technological applications for ICT integration. These facts are based on several surveys on teachers in Smart School Pilot Project conducted by Siti Hawa (1998), Jami'ah (2003), Suzana (2004) and also Mohd Arif and Norsiaty (2004). Suzana (2004) found that most teachers in Smart Schools in Wilayah Persekutuan Kuala Lumpur and Selangor demonstrated the middle level of technology integration in their teaching and learning process. Surprisingly, Mohd Arif and Norsiaty's study (2004) revealed that the integration into the teaching-learning process among the Smart School teachers in Kuantan was relatively poor. As a result, the usage of smart school teaching coursewares and Internet-based was very low.

The above scenarios prompt us to think seriously about the current situation in our smart school environment. The Government has built networks, selected quality resources, and begun the job of educating teachers on the use of technology in teaching and learning. Are teachers ready for the new challenges that these new technologies pose? What are the barriers that hinder the usage of electronic information sources provided in schools? After all, these are some of the major factors, which call for an exploratory study to examine the current status of the teachers' usage of electronic information sources in smart schools. And thus, to find out the teachers' perceptions on the need for developing a digital school resource center (SRC) in smart school environment.

1.5 Aim of the Study

This study aims to explore the level of usage of electronic information sources and services in teaching and learning, as well as the impact of its usage. This study intends to identify the ICT knowledge and proficiency among teachers in Malaysian Smart Schools with the necessary skills required for the digital era. Besides, this study attempts to find out the barriers in using the electronic information sources in teaching and learning processes and ascertains whether there is a need for developing digital school resource center in Smart Schools.

1.6 Research Objectives

The objectives of the study were:

- 1.6.1 To identify ICT knowledge and proficiency among teachers in Malaysian Smart Schools with the necessary skills required for the digital era.
- 1.6.2 To assess the level of usage of electronic information sources and services among the teachers in Smart Schools in teaching and learning processes.

- 1.6.3 To ascertain the need for developing a digital school resource center in Smart Schools.
- 1.6.4 To highlight the barriers in using electronic information sources among teachers in Smart Schools.

1.7 Research Questions

To achieve the above aims and objectives, the following research questions were used to guide the study.

- 1.7.1 What is the level of ICT knowledge and proficiency among teachers in Smart Schools?
- 1.7.2 What types of electronic information sources do the Smart Schools teachers' use in teaching and learning processes?
- 1.7.3 To what extent do teachers utilise electronic information sources in teaching and learning processes?
- 1.7.4 What are the teachers' perceptions on the impact of using the electronic information sources on the student information skills?
- 1.7.5 What are the teachers' perceptions on the need of developing a digital school resource center?
- 1.7.6 What are the barriers in using the electronic information sources in teaching and learning processes in school?

1.8 Significance of the Study

This study will provide important information for the Ministry of Education on the impact of the use of ICT in education in the Smart Schools Project. This information is potentially useful for the Ministry to see how these “multi-million investments” could be used to improve teaching and learning in the classroom for the ICT-based schools. Specifically, this study has three significant reasons for educational purposes:

1.8.1 The computer literacy was introduced into teacher training programme in 1994 and the Ministry of Education will continue to facilitate the structural changes needed to develop tertiary education both in public and private sector which is essential to bridge the fundamental shift to a knowledge based society. Too often, most training for teachers concentrated on workshop on how to use software without any common understanding on how ICT can or should be used to achieve curriculum objectives in the classrooms. As such, this study will help to provide an overview on the current status of ICT proficiency among teachers in Smart Schools after attending those computer training organised by the Ministry.

1.8.2 Due to the huge cost development involved; resources, energy, time and money need to be spent and utilised wisely. The Ministry of Education has fully participated in this development through the provision of resources, guidance and information in line with our country’s vision. The State Educational Resource Centers (SERC) have already supplied many electronic information resources to all schools in various forms such as CD-ROMs, Internet equipment, television programmes and provided links to a number of web sites. Nevertheless, schools normally focused more on getting computers into the classrooms rather than using them effectively once they are obtained. Thus, it is essential to determine the level of usage for those facilities whether those things have being used at maximum level or still need to be upgraded.

1.8.3 As the outcome for the greater usage of these resources, it is relevant to identify the need for developing digital school resource center in Smart Schools. They will be the catalysts in the establishment of the future digital SRC in all schools in Malaysia. The National Library of Malaysia can also cater the need of digital SRC in schools environment as well as to control the copyright issues.

It is hoped that knowledge of the results of this study will draw the attention of the various agencies in the Ministry of Education to examine the existing usage of electronic information sources. For staff development activities, it is essential to assess to what extent the teachers understand about ICT and how much the usage is in the classroom context. Henceforth, the Ministry can identify next action plans towards their further development. Moreover, the results of this study will add to the academic writing on educational research in Malaysia and provide information to researchers for future studies in the development of ICT and direction for any further changes.

1.9 Scope of the Study

This study was designed to examine the usage of the electronic information sources and services by secondary school teachers in the teaching and learning processes. This is confined to the Malaysian Smart Schools Pilot Project due to the fact that these schools are provided with sufficient and sophisticated infrastructure for educational technology in teaching and learning purposes. Also the teachers from Smart Schools Project were chosen with the assumption that they have attended computer courses in management of the resources and processes using the latest technology to support teaching and learning for the smart instruction in education.

Specifically, this study examined the encouraging skills amongst those teachers in the use of ICT related facilities such as the use of CD-ROMs / CDRI coursewares, Internet, educational television and online educational portals that have been provided by the Ministry. This study mainly focused on the use of electronic information sources among teachers in the smart schools, particularly the school resource centers and computer laboratories to facilitate learning and teaching processes.

1.10 Limitations of the Study

The scope of this study was limited to eleven secondary smart schools in Selangor. The small sample size prohibited broad generalization of responses because it reflected the opinions of one or two teachers in each school. Focusing on the use of electronic information sources limited the scope as well, because some smart schools face problems of ICT infrastructure and limit their attention to the use of printed resources. Although this study does not depict the scenario of the entire country's condition, it provides us with a clear view of what happening in a number of smart schools. This research was conducted, as a contribution to the understanding of how smart schools teachers use the electronic information sources in teaching and learning as well as preparing the smart schools towards developing a digital school resource center. Due to limited financial resources, the researcher was unable to get large amount of sample within the limited period of time and thus information was sought from eleven secondary smart schools in Selangor. Since each of the smart school is situated in different districts in the state of Selangor, it was the researcher's opinion with the supervisor's approval that the total number of respondents was sufficient to represent Selangor including both smart schools in urban and rural areas.

The data required has been collected using a questionnaire as the data-gathering instrument distributed among the subject teachers, teacher librarians and also Information Technology Coordinator (ITC). In doing so, the researcher has only relied on the accuracy of those completing the questionnaires. The answering of the questionnaires was definitely beyond the control of the researcher. Therefore, the findings may not be generalized to other smart schools in Malaysia. As the study was carried out among randomly selected teachers in smart schools, who were mainly based on their knowledge and experiences, a certain amount of bias may be present in terms of options for answers, perceptions, proficiency in ICT and frequency of usage of electronic information sources. Attempts were made to minimise these situations by pre-testing through a pilot study but certain biases may still be present in the final questionnaires.

1.11 Definition of Terms

Several terms need to be defined clearly in order to avoid any ambiguous understanding. Those terms are:

Electronic Information Source (or resource) refers to material consisting of data and/or computer program(s) encoded for reading and manipulated by computer using the peripheral device are directly connected to the computer or remotely via a network such as the Internet (AACR2). This category includes software applications, electronic texts, bibliographic databases and multimedia coursewares. Since the Ministry of Education has provided educational television in the package of teaching materials, the researcher also includes it in this study as one of the information sources at schools.

Usage means the number of times an electronic information source is being used by teachers in smart school in teaching and learning processes whether it has been used once a week, once a month or has never been used. For the purpose of this study, focus will be given on the usage of selected electronic information sources and services in the Smart School Project as elaborates further in the literature review.

Smart School refers to the Malaysian School that is a learning institution that has been systematically reinvented in terms of teaching-learning practices and school management in order to prepare our children for the information age. A Smart School will evolve over time, continuously developing its professional staff, its educational resources and its administrative capabilities. This will allow the school to adapt to changing conditions, while continuing to prepare students for life in the Information Age.

*- Smart School Flagship Application Blueprint
Ministry of Education Malaysia
26 July 1997*

Teacher Librarian or SRC Coordinator refers to a teacher who is in charge of or responsible for managing the SRC. The library teacher or coordinator is a trained teacher who is tasked with supervisory library duties, in addition to regular teaching assignments. There are a variety of terms used in different countries to describe the person such as 'school librarian', 'teacher-librarian' and 'school media specialist' (Abrizah, 1998).

Information Technology Coordinator or ITC refers to a teacher who is in charge of or responsible for managing the School Computer Laboratories or Smart Lab. The ITC is the single point of contact between the Help Desk and the school for logging in problems with any part of the Smart School Integrated Solution, including the network. The school ITC is responsible for administration of approved access to each computer platform, monitoring exceptional security events and etc.

School Library or School Resource Center means a library in a public or private elementary or secondary school that serves the information needs of its students and the curriculum needs of its teachers and staff, usually managed by a *school librarian* or teacher librarian. A school library collection usually contains books, periodicals and educational media suitable for the grade levels served. Synonymous with learning resources center, school library media center and also *Pusat Sumber Sekolah*. The term “school resource center” or SRC is used henceforth in this study for uniformity.

Digital Library is a library in which significant proportions of the resources are available in machine-readable format (as opposed to print or microform), accessible by means of computers. The digital content may be locally held or accessed remotely via computer networks. In libraries, the process of digitisation began with the catalog, moved to periodical indexes and abstracting services, then to periodicals and large reference works, and finally to book publishing.

1.12 Summary

This chapter primarily focuses on the aim of the study that is to identify the use of electronic information sources and services by teachers in Malaysian Smart Schools in the teaching and learning processes. It examines the teachers’ ICT skills and proficiency as well as the type of electronic information sources used in the classroom for the ICT-based schools. Besides, it also attempts to find out the barriers in using those sources and consequently, this study ascertains the need of developing a digital school resource center in all smart schools. The background of the study explains about the preparation towards the Vision 2020 and the objectives of the Malaysian Government to produce a world-class workforce as well as to support K-economy master plan through enormous financial

investment in ICT integration and implementation of Smart School Project. Efforts will be intensified in the provision of technology access and will enable all Malaysians to take advantage of advances in ICT to improve efficiency and productivity, thus contributing to the increased overall competitiveness of the economy.

Several research objectives and questions are listed to guide the study and the significance of the study as well. This study will provide important information on the impact of the use of ICT in education in the Smart Schools Project and potentially useful for the Government to see how these “multi-million investments” could be used or implemented to improve teaching and learning processes. The study’s identification of electronic information sources use patterns and teachers’ attitude about their use of those resources could assist Ministry of Education in making long-range plans for education activities and development. The scope and limitations of the study together with the definition of terms are also explained in this chapter and the literature review will be discussed in Chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The aim of this study is to identify the level of usage of electronic information sources and services among teachers in Malaysian Smart Schools. This study examines the encouraging skills among teachers in the use of information and communication technology (ICT) related facilities such as the use of CD-ROMs, educational television, Internet and online education portals for smart teaching and learning materials. Next, this study explores the ICT knowledge and proficiency on the impact of implementing the ICT integration among those teachers. It also attempts to find out the barriers in using the electronic information sources in teaching and learning processes. In addition, this study ascertains whether there is a need of developing digital school resource center (SRC) in Smart Schools.

The information examined in this literature review includes dissertations, government studies, university studies and journal articles dealing with the concept of Smart Schools, information and computer literacy in order to relate with usage of the electronic information resources amongst teachers towards developing the digital SRCs in Smart School environment. Several sources were used to locate these studies, including general and specialized bibliographical tools, abstracts, online catalogs of library holdings, various online databases which were mostly taken from Emerald Databases and the bibliographies of previously identified studies. The periodicals and monographs consulted include Journal of Education for Library and Information Science, Journal of Information Technology in Teacher Education, Malaysian Journal of Library and Information Science and several collections of Conference Papers.

A search was made on the collection of theses and dissertations at University Malaya Library as well as libraries in other local universities regarding the Malaysian Smart Schools and school resource centers development to obtain current information on usage of electronic information resources. The Internet search was done to find out several collections of theses, dissertations and proceeding at other local and international universities related to this topic. The keywords that were used to retrieve the literature were smart schools, school libraries, information literacy, computer literacy, electronic information resources, smart teaching and learning and various combinations of these keywords.

2.2 Role of the Educators in the Information Age

Learning environments in the twenty-first century will continue to evolve with the assimilation of technology and its attendant benefits (Austin, 2004). The growth and advances in ICT have hastened the pace of globalisation and the trend is irreversible. Malaysia could not resist the information explosion as it exists in a boundless and global scenario. By the year 2020, our country is moving rapidly and steadily towards its goal to achieve status of 'fully developed nation'. In order to make this vision a reality, Malaysians need to make a fundamental shift towards a technology-driven culture in practically all aspects of life. Much efforts should be undertaken to enhance human resource development to provide adequate skilled and knowledge manpower to support the knowledge-based economy. Siti Zaiton (1998) mentioned that while launching the National Information Technology Awareness Campaign, the fourth Prime Minister of Malaysia, Tun Dr. Mahathir Mohamad (1997) put in his words:

"..... With our future at stake we cannot afford to be a mere spectator of the information revolution. We need to be part of it; we need to even lead it. This was why Government had spent so much time and effort to turn the local IT industry into a world class one...."

(Source: New Sunday Times, October 12, 1997)

In this Information Age, the rapid technological changes make it impossible for everyone to know everything without acquiring information skills that will help to access, evaluate, use and learn how to present information in the proper manner. Schools, therefore have a vital role in teaching students to prepare themselves to live and work in an information-centered society. In this 21st century, the role of the educator is shifting towards facilitation of knowledge creation. Educators have a crucial responsibility to develop the necessary information skills in preparing students to be independent learners as well as inculcating information skills to prepare the students for the journey of lifelong learning (Smith in Austin, 2004).

The teacher as attitude-changer would be expected to exhibit positive values, good communication and interpersonal skills, be energetic and optimistic in outlook. Teachers should be more concerned on how students select and apply the knowledge they are presented with rather than in their ability to classify, repeat or copy masses of information. In short, Hanafi (1996) concluded that teachers should be a good role model for students to emulate. Thus, information and thinking must be complementary in order to create a culture that encompasses students into good thinking practices. This would enable students to connect themselves to experiences outside of the school and to think logically and creatively about everyday events in an increasingly technological world.

There have been rapid technological changes in today's world which demand the information skills curriculum to be expanded to provide opportunities for students to access and use a variety of non-print information sources, formats and technologies as an integral part of their learning. With the expansion of on-line databases, the Internet and interactive media, students are exposed to vast quantities of information in differing formats. Therefore, information skills will be an essential survival skill for lifelong learning in this new millennium (Tan, 1996).

2.2.1 Computers and Information Literacy

Over the years, computers are the most important means of technology for students and educators to acquire new knowledge and practice the skills necessary to exploit the use of electronic information resources. If properly managed and fully utilised, computers can bring amazing benefits to education in Malaysia. Malaysians thereafter, will be able to adapt new technologies in accessing and managing the information explosion and become more creative and innovative in their thinking (Rahimah, 2001). One of the most important uses of computer since early 1960s is to learn about computer itself together with the related fields such as computer development history, processing of data, programming and information science. In fact, learning about computers is the utmost importance especially during the late 1970s and prior to the application of software. Since the late 1970s and mid-1980s, computer literacy was the main topic, and according to Siti Zaiton (1998), focus for discussion among educators in the world is towards Computer Integrated Instruction (CII).

The Ministry of Education has taken positive steps to fully equip and facilitate schools with the latest computer technology so that the groundwork for a future society that is both computer and information literate could be laid. In her study, Kaur (1995) indicated that the Computer Literacy Pilot Project (CLPP) was launched in April 1986 to initiate the first phase of formal educational computing in Malaysia. This initially involved twenty schools from urban and rural areas in Malaysia which every participating school was provided with five microcomputers and a new subject, "An Introduction to the Computer" was taught to Form Four students. She added that the next phase in the development of instructional computing in Malaysia started in the 1990's and this era clearly signified the shift of interest from computer literacy per se towards computer integration across the curriculum.

Today, the emphasis of computer literacy involves understanding of computer hardware and software. The method of using computer in this manner is also known as teaching and learning with computers. The existence of a flexible teaching source and assistance in learning processes are very important in using the computer as a tool for pedagogy. In addition, Siti Zaiton (1998) mentioned that computer literacy also encompasses enhanced learning across content areas, multimedia, hypermedia and telecommunications. However, before switching those computers on, many issues need to be taken into considerations, from such practical and technical aspects as hardware, software and technical support to philosophical issues of content, standards and evaluation. In fact, the effective use of those equipments should be given a big attention to ensure the students and teachers are not computer or information illiterate in the future.

Information literacy is the combination of understanding, knowledge, skills and attitudes that students and teachers need to fully contribute as members of society in the Information Age. In a study about information literacy in Europe, Virkus (2003) reported that Boekhorst (2003), from the Netherlands, finds that all definitions and descriptions of information literacy can be summarized in three concepts:

- a. The ICT concept: Information literacy refers to the competence to use ICT to retrieve and disseminate information.
- b. The information resources concept: information literacy refers to the competence to find and use information independently or with the aid of intermediaries.
- c. The information process concept: information literacy refers to the process of recognizing information needs, retrieving, evaluating, using and disseminating of information to acquire or extend knowledge. This concept includes both the ICT and the information resources concept and persons are considered as information systems that retrieve, evaluate, process and disseminate information to make decisions to survive, for self-actualisation and development.

It is clear that when both students and teachers have become information literate, they can develop an ability to select, interpret, evaluate, manipulate and present information in a meaningful way. Obviously, the Malaysian Government is serious about introducing technology to all schools with the objective to expose teachers and students to the basic knowledge in computer literacy. As reported by Teh (1996) in his research, under the Sixth Malaysia Plan (6MP, 1991-1995), a computer literacy program was launched as a pilot project in selected primary and secondary schools in the country. The Computer-in-Education (CIE) programme was introduced and many schools were provided with computer laboratories. The Computer-Aided Instruction Programme for Mathematics and English was expanded to primary schools while computer literacy was introduced as a subject for students as well as a co-curriculum activity at the secondary school level. For the secondary vocational and technical schools, students were taught designing and programming using software such as Computer-aided Design / Computer-aided Manufacturing (CAD/CAM). In public institutions of higher learning, campus-wide networking systems based on high-bandwidth fibre optic backbone were installed to provide facilities for multimedia applications in distance learning and communication.

Computer literacy has been promoted, but computer literacy by itself is not sufficient to attain the desired results when knowledge of information searching skills is concerned. Unlike computer literacy, information literacy is not classified as a critical success factor for a productive worker. Chan (2003) addressed this issue about the importance of information literacy program to produce the type of knowledge workers. She noted that information literacy may be actively accepted by educational authorities in many developed countries in the United States, Canada, Australia, New Zealand and the United Kingdom but still not so in Malaysia and many other countries in Asia and Africa. Indeed, the school resource center plays a key role in the successful implementation of the information skill component.

The role of SRC is definitely to have far greater influence on the educational setting that provides students with evolving experiences rather than as a static repository of knowledge. As a result, Teh (1996) suggests that the teaching of information searching skills should commence in the schools and the information literacy programs must be complemented with the implementation of a school automated library system to contribute towards the objectives of building an information-rich society. The development of electronic school libraries will ensure they are well resourced with a mix of traditional and electronic information sources in a variety of formats. Apart from that, Hanafi (1996) envisioned the libraries of the 21st century to be only equipped with computers and compact discs thus requiring less space and being more mobile.

2.2.2 Technology as an Educational Tool

In this new millennium, the local ICT industry has changed tremendously and the pervading use of ICT necessitates the education system to introduce ICT in schools. One of the basic reasons why ICT was introduced at the school level is to equip the students with the competencies towards producing an ICT literate work force and thus able to meet the challenges of the Information Age (CDC, Ministry of Education, 1998). In the process of developing technology-driven culture and information rich society, the knowledge that is delivered has to be aligned with the current needs and progress of the country. This is affirmed by the Malaysian Integrated Curriculum for Secondary Schools (ICSS) that emphasizes both the intellectual and personal developments of the student as envisaged in the National Education Philosophy. Based on the syllabus for Information Technology (IT) in ICSS 1998, the education program in Malaysia specifically for schools is drafted on the basis of developments of a complete and balanced individual in terms of intellectually, spiritually, emotionally and physically.

One of the strategies employed by the Malaysian Government to achieve its goal to produce thinking and technology-literate workforce is through the applications of the technology into teaching and learning. The Ministry of Education indicates that ICT integration into teaching and learning process is undeniably capable of improving the quality of education. The development of students' critical thinking skills and creative skills are in line with the current approach expounded by the Ministry (i.e. KBKK or *Kemahiran Berfikir secara Kritis dan Kreatif*). These skills can be implemented with the use of interactive multimedia which suits the objectives of the KBKK program such as to create ideas or inventions which are creative and innovative, apply the knowledge, experience the thinking skills in practical situations within or outside the school premises (Koay, 1999).

Definitely, ICT is concerned with the use of tools and processes in managing information of various forms. According to Singh (1996), technology provides school libraries with an opportunity for better access and encourages teaching and learning to be more effective. Ordinary facilities such as radio, television, tape recorder, videocassette recorder and stand-alone computers allow for more effective teaching and learning. However, the sophisticated technologies like online public access catalogues (OPACs), online databases, local area networks (LANs), teleconferencing facilities, interactive videodiscs, CD-ROMs and distance education networks can open up a whole new world of possibilities for the school library.

2.3 The Concept of Malaysian Smart School

The Government believes education to be the most important use of technology, so it is rewarding to see the country develop a comprehensive plan for using technology in the schools via the Smart Schools Flagship. To realize "Vision 2020" and to lead Malaysia into the Information Age, it is obvious that the Ministry of Education put a lot of attention to ICT

in schools. As part of its overall effort, Hamidah (2000) stressed that the government has implemented the Malaysian Smart School, a learning institution that has been systematically reinvented in terms of teaching-learning practices and school management, with the aim of:

- a) producing a thinking and technology literate workforce, democratising education, increasing participation of stakeholders, providing all-round development of the individual and providing opportunities to enhance individual strengths and abilities; and
- b) supporting the developments of the “MSC” through the transfer of technology research and development as well as other activities relating to it.

(Smart School Project Team, 1997a)

Based on the above aims, one factor that distinguishes smart schools from other schools is the use of technology as an enabler to support and enhance teaching learning in preparing our children for the Information Age. As far as the smart school is concerned, the term ‘smart’ means intelligent, clever and ingenious which goes beyond using computers and its components (Zakiah, 2000). With the systematic change in education, the students will be taught to be more creative, analytical and proactive in the classroom whereas teachers play the role as a facilitator by organising a conducive and stimulating learning environment for students, based on the given curriculum (Salbiah, 2003).

In smart schools, learning will be self-directed, individually paced, continuous and reflective. This will be made possible through the provision of multimedia technology and worldwide networking. With these facilities, learning will shift from being teacher-centered to students-centered, supported by flexible and open-ended curriculum (Smart School Project Team, 1997b). Currently, the common approach in evaluating ICT effectiveness seems to concentrate more on the achievement scores in government examinations such as *Penilaian Sekolah Rendah* (UPSR), *Penilaian Menengah Rendah* (PMR) and *Sijil*

Pelajaran Malaysia (SPM). Instead of more examination-dominated culture that we are used to, the Smart School system hopes to create a thinking culture with combination on technologically oriented to fulfil the need for children to be literate in the Information Age.

To face these new challenges, Hizamnuddin (1997) has emphasised in his article (*Dewan Masyarakat*, December 1997), it is insufficient to be merely smart school if the teachers' minds were not in line with the smart environment. As the society in the 21st Century is transformed from an industrial society to an information society, Siti Zaiton (1998) also stressed that we need not only have Smart Schools and Smart Students, but the most important is '**Smart Teachers**'. Therefore, she concluded that the positive attitude of Smart Teachers towards computers could be a catalyst to increase the level of computer literacy, which is important in setting up of the smart schools. This is in line with the vision of Malaysian Education Ministry to realize all Malaysian schools to become smart schools by the year 2010 (Baharum, 1997), which modern technology education is combined in the area of science and technology, i.e. technologically oriented.

A smart school is not all about technology as there were few common misconceptions. For instance, Salbiah (2003) mentioned that once the idea of implementing smart school was brought forward, people started to imagine students get their education with their eyes glued to the computers twenty-four hours a day and seven days a week. Lee (1998) analysed another aspect of misconception and stated that the smart education will be unsuccessfully practiced if there are many teachers who were still vague on the concept of smart school; the technology as an enabler will not be fully utilized as teachers' ICT skill is still low. Both findings are similar with Adnan's (1998) who examined the preparation of Smart Schools in the district of Kinta, Perak. He stated that before putting technology in schools, principals of the school should be able to identify the characteristics of a proper technologically driven school. He made a conclusion that school management and

administration must be smart before turning to smart school as smart management will definitely be proactive, independent and able to transform the traditional schools into Smart School without merely waiting for the instructions.

In a study about conception on smart education, Jami'ah (2003) elaborated that teachers perceived smart education as a holistic, balanced and an integrated process. She noted that teachers interpreted smart learning as knowledge building activity according to competencies, which is challenging, fun, co-operative, competitive and lead to information sharing from various sources. Besides, teachers regarded the use of smart technology as the optimum use of technology and effective maintenance to upgrade the quality of teaching and learning. In other words, she inferred that teachers used global integrated perspective to interpret smart education. However, in a study on teachers' perception towards the implementation and the role of Smart Schools in Negeri Sembilan, Azlina (1999) found that teachers have a positive perception towards smart schools but their preparation is regarded low.

Initially, the development of education is a major undertaking that needs the co-operation of all parties including parents and the community at large. Corporation and support from all teachers and the management is very crucial because the success of the smart schools depends on the stakeholders such as Ministry of Education officers, principals and support staff. All of them should be involved and must be trained professionally in the knowledge, skills, and perceptions necessary to fulfil their roles. Concurrently, information technology can be the catalyst in the process of transforming traditional schools into smart schools. In short, technology and full support from stakeholders are indispensable for the success of the smart schools implementation.

2.3.1 The Implementation of Malaysian Smart School Pilot Project

The Smart School Pilot Project ran for three or four years from 1999 to 2002 with the aim to determine how integrated telecommunications and computing infrastructure could help to improve teaching-learning and school management processes. The Ministry of Education and Telekom Smart School Sdn. Bhd. (TSS) were developing the Smart School Integrated Solution (SSIS) in which one of the components is Teaching Learning Materials (TLM) and Courseware is a sub-component of TLM. It has to be reiterated that the SSIS is very cohesive and integrated and thus Malaysia can proudly proclaim that it is one of its kinds in the world (Hamidah, 2000). As stated in Salbiah (2003), Dr Norrizan Razali, the manager for Smart School Flagship quoted;

“....The software integrated in the Smart School System provides a very systematic way of monitoring students’ level of progress. A typical scenario of a Smart School would see more of students’ interaction among themselves, using the latest technology. Instead of learning solo, students now work in teams physically and virtually...”

Essentially, the Smart School Network supported the Ministry’s policy and master plan for ICT use in education. Since the network is part of the Smart School Pilot Project, it was designed as a stand-alone virtual private network separate from Ministry’s main network, KPMnet. The pilot project portal, BESTARinet was linked to the network, which provides the pedagogical content for the schools, has links to commercial educational websites and to the Ministry’s main websites. In addition, learning areas are designed to help students achieve overall and balanced development with which the goals are aligned. Furthermore, high-technology media like computer-based teaching-learning materials, the Internet and the World Wide Web, are integrated into conventional media (Ministry of Education, 2002).

As far as technology infrastructure is concerned, all the compulsory installations have been completed in all 3 levels of schools i.e. 9 'A' schools, 79 'B' schools, and 2 'B+' schools. These levels are arbitrary classification to identify the level of technology in the schools. The assignment of technology levels of a particular school is based on the number of computers in the school. A summary of the equipment provided to the schools with the number of computers allocated to the levels of technology is presented in Table 2.3.1 as follows:

Table 2.3.1: Level of Technology in Smart Schools

Level B (Laboratory Model)	Level B + (Limited Classroom Model)	Level A (Full Classroom Model)	Data Centre	Help Desk
37 computers	81 computers	520 computers	10 computers	13 computers
2 notebooks	2 notebooks	5 notebooks	1 notebook	2 notebooks
3 servers (communications, databases, applications)	3 servers (communications, databases, applications)	6 servers (communications, databases, applications)	3 servers (communications, databases, applications)	5 servers (communications, databases, applications)
Fast Ethernet backbone (100 baseT) with 128/64 kbps leased line	Fast Ethernet backbone (100 baseT) with 128/64 kbps leased line	Fast Ethernet backbone (100 baseT) with 512/256 kbps leased line	COINS leased line (2 Mbps)	COINS leased line (2 Mbps)

(Source: Ministry of Education, 2002)

The Ministry of Education (2002) reported that with the completion of the pilot project and subsequent expansion of the Smart School Team by 2003, all 9,000 odd schools around the country have been changed. The pilot project has been expanded to become the Malaysian SchoolNet Project that is aimed at providing Internet access to all 10,000 schools in the country. As Dr Norrizan explained in Salbiah (2003), all the 90 pilot schools are ready for the National Rollout and the whole complete system would be implemented

on the entire pilot schools simultaneously. She further adds that by the year 2003, the rest of the schools in our country would be upgraded to become Smart Schools gradually. However, Dr. Norrizan also mentioned:

“Changing and upgrading the schools of the whole nation would take some time. Obviously, these would be done in stages, but how this is done is yet to be determined as there are issues like the teachers’ training, the number of schools around the country, their infrastructure, need to be resolved before we actually get down to implementation”.

2.3.2 The Report Observation on Implementation of the Smart School

The Report on Collaborative Observation on Implementation of the Smart School Pilot Project 2001 accomplished by School Division, Ministry of Education on January 2002 indicates that most of the teachers and students are aware of some of the change management resources available in all Smart Schools Pilot Project. The school’s management, teachers and students demonstrate their commitment and belief in the school’s change management programme through their active participation and attitude. The usage of resources among teachers, however, is limited to printed materials while the usage of technology equipment is less optimum used and the information technology integration, including Internet, is still limited in the teaching and learning processes. The above report is highlighted to relate with the present study on how the technology integration was implemented in the pilot smart schools. Although the subjects and issues are quite similar, this study’s approach will be different in terms of the focus and objectives to examine the usage of electronic information sources in teaching and learning processes towards identifying the need for developing digital school resource centers.

The observation of the report reveals that some of the teachers are unable to change the traditional teaching and learning paradigm to smart teaching and learning. There are teachers who gave minimal readiness in performing smart pedagogy due to the assumption that the practice could not solve the problems of finishing the syllabus. There are also teachers who are reluctant and less ready to accept criticism to change that perception towards the smart TLM, which has been labeled as burdens. To less positive teachers, they are more confident with the traditional method because they are of opinion that the method is more relevant for examination requirements while the smart teaching method is considered as slowing down the teaching and learning process. Nevertheless, there are teachers who gave high commitment or readiness in practising the smart pedagogy. Most teachers are positive and confident on the smart teaching performance except some minority who stressed on the need of in-house training on smart pedagogy, generic skills and more time to develop sophisticated teaching materials.

The Case Study One on ICT Integration into Education in Malaysia (Ministry of Education, 2003) also reports on the Malaysian Smart School Pilot Project. The Ministry has introduced electronic Teaching and Learning Materials (TLM) for four subjects, namely Bahasa Melayu, English Language, Science and Mathematics in the forms of browser-based courseware, teacher's guides, student worksheets, and exemplar lesson plans to guide teachers in integrating the use of the courseware in their lessons. The in-service and pre-service training conducted by the Teacher Education Division also concentrated on these four subjects. As a result, the other subjects' teachers and other staff members regarded themselves as non-Smart Schoolteachers, even within the Pilot Schools.

While the teachers of the four subjects tried to apply the Smart School pedagogy and materials recommended in the Conceptual Blueprint, the other teachers generally maintained their usual methods of teaching. Fortunately, the Ministry of Education had emphasised generic skills, higher order thinking skills, learner-centred teaching and cooperative learning long before the start of the Smart School Project. Therefore, the better teachers were already practising “smart pedagogy” by using a variety of methods, strategies, tools and materials to cater to the individual differences in their students, with or without ICT. However, the main concern in this present study is to assess the current usage of electronic information sources and the information technology integration among teachers and whether the usage of smart technology is at optimum used or not.

2.3.3 The Impact of Implementing ICT Integration in Education

The impact of ICT integration in education is mainly determined through surveys and research. ICT is believed to empower teachers, transforming teaching and learning processes from being highly teacher-dominated to student-centered. Today, most countries include ICT integration, either in their national policies or in laws pertaining to the education sector. The use of ICT is widespread and continuously growing in the school system in the Asia-Pacific Region, as in the other regions of the world. The Commonwealth government in Australia, for example, has set goals for schools in relation to ICT development. Meanwhile, in Thailand, the National Education Act of 1999 formed the core of education reform towards ICT use in education, as guided by three principals’ strategies: value-added, equity and quantum jump. Similarly, the Philippines Education Department also formulated policies for the use of ICT. The same trend is seen in other ASEAN countries like Malaysia, Singapore, Vietnam and Indonesia, where the national government sets goals in implementing ICT integration in education (Source: www.unescobkk.org/education/).

Besides the Smart School Project, as part of the Ministry of Education's function to "provide equal access to quality education to every child", educational programmes involving ICT include the teaching of Science and Mathematics in English, the school computerisation programme, and the Universal Service Provision Project. The Teaching of Science and Mathematics in English Programme was implemented in 2003 in all schools in the country. The Government recognised that English has become the language of the internet, and thus students need to be able to access materials from the Internet competently in order to keep up with the pace of development in Science and Technology. Teachers are provided with specially designed teaching courseware, laptops, and LCD screens and projectors to ensure that lessons are interesting, and that students do not lose out because of language proficiency (Ministry of Education, 2003).

The ICT allows the availability and accessibility of vast amount of information for users to evaluate, process, digest and select the relevant information that is required by users (Wan Mohd Fauzy, 2003). This challenge has generated new approaches to the evaluation of learning which in turn have contributed to the changed roles of teachers. Suzana (2004) had described efforts in preparing the teachers for technology integration in the Smart School Pilot Project and stated although the teachers are mostly competent in the use of technology; the frequency of integration among them is rather low. This clearly hints that their roles certainly need to be redefined; teachers in a technology-integrated school will have a greater responsibility for managing their classes and planning effective instruction. Furthermore, Ab. Rahim (2000) emphasized that students must be taught with various teaching methodologies and media in pedagogy. It means teachers need various strategies to integrate technology into the curriculum through cooperative and collaborative learning, findings enquiry with multiple intelligences which are more towards student centered (p. 112–113).

2.4 Computer Literacy Training among Teachers

Since the early nineties, there are many literature reviews made on computer training and studies that have been carried out on students', teachers', and lecturers' attitudes towards computers and information technology (Chettrilah, 1998). Many studies have suggested that a strong need for computer literacy among teachers (Teh, 1996; Siti Hawa, 1998; Chan, 2001) and believed that use of computers in pedagogical process would improve the quality of education as well as assist in intellectual growth (Azlina, 1999; Jami'ah, 2003). Teachers need new pedagogical skills so they can take full advantage of the potential of technology to enhance student learning. In turn, the continuous computer training will help and support the teachers to boost their confidence and self-esteem thus making them to be better teachers.

The integration of ICT into classroom teaching has been made compulsory for all pre-service teachers since 1999. However, not all in-service teachers have been trained to integrate ICT into their teaching practices. The Ministry of Education through the Teacher Education Division is responsible for providing training to the pre-service and in-service of Smart Schoolteachers with ICT skills and utilising pedagogical approaches in teaching-learning environment. As such, various government agencies and commercial bodies conduct training for teachers in the use of both the hardware as well as the software application. Many corporate bodies such as Intel (M), Microsoft Corporation, Sun Microsystems (M) Sdn Bhd and MIMOS also involved in the program to provide ICT related skill training for teachers (Wan Mohd Fauzy, 2003).

The attitudes of the teachers towards the use of computer or ICT in general is dependent on the training received while undergoing their teacher training programs whether in the teachers' college or universities. Robiah and Nor Sakinah (2003) find that most of the teachers attained their professional computer courses while completing their diploma in

education through *Kursus Perguruan Lepasn Diploma* (KPLD), *Kursus Perguruan Lepasn Ijazah* (KPLI) and bachelor degree in education. Furthermore, to incorporate the new Smart School system, teachers are required to go through a 14-week in-service training course which aimed at enhancing the skills of the teachers to undertake their role as facilitators and guide (Salbiah, 2003). To give more exposure on ICT literacy, other courses and training for teachers in smart schools include Induction Course Package, TLM Precision Application Course, in-house training and various courses organized by schools, District Education Office, State Education Department and State Education Resource Center.

It was reported that many teachers do have positive attitudes toward ICT when they were given training in computer literacy and have even tried to adopt ICT in their daily school management activities. Based on the survey done by Chetrilah (1998) she finds that teachers' attitudes are more positive when they have prepared to handle ICT and have been given the exposure to use them. She indicates the factors that affect attitudes of the teachers, particularly those involved in School Resource Center, are the ability in handling and operating the technology and computer exposure specifically in using the computers for the various tasks in managing the SRC.

Teachers are expected to be technology competent and ICT literate so as to be able to create technology-rich and academically sound teaching and learning environment. If the Government's efforts to introduce computers in schools are to be successful in the future, all Malaysian teachers need to be trained and prepared to use the computers in schools. Meanwhile, in her study, Zoraini (1995) as cited in Chetrilah (1998) finds that Malaysian teachers tend to shy away from computers when she reveals that it was estimated only about 5% of Malaysian teachers use computers in schools. Apparently, teacher's training must be given a top priority because if teachers are not trained in the usage of ICT, the

infrastructure is in the danger of remaining obsolete and unused. To prevent this from happening, professional training is a prerequisite for any successful smart school implementation. As mentioned by Bill Gates (1996) in his speech:

“...Educators have clearly thought about more than just putting PCs in schools, but rather how to integrate PCs into the learning curriculum, and how to train and involve teachers in their new roles...”

Knowing how much the teachers understand about ICT and how much they use it in the classroom is essential for staff development activities (Koay, 1999). It is not surprising that teachers who receive this sort of training experience problem when they try to transfer their knowledge and skills to a real classroom situation. Siti Hawa's study (1998) seems to confirm that the teachers lack specific knowledge of important aspects such as the smart assessment and also lack of confidence to teach in technology-supported classroom environments. Jami'ah (2003) revealed that teachers are having problems in the building of smart education eventhough they had their training earlier. Teachers could not describe in details the aspect of smart education, as they did not have extended knowledge on the perspective concerned. Suzana (2004) highlighted a study by Abd Rahim & Shamsiah (1998) who found a majority of in-service teachers in Malaysian Vocational and Technology Schools do not have a good command of knowledge and ICT related skills in pedagogy. Their study indicated that the respondents could not do programming and more than half were not capable of using word processing, desktop publishing, electronic spreadsheet and databases.

Similarly, the study done by Kong and Lee (1999) revealed that a majority of principals of smart schools (65%) have a very limited ICT knowledge and skill while 32% of them have no skill at all. Most of them are only good and comfortable with word processing but their skill is relatively low in other aspects of ICT literacy which is critically important in the smart

school curriculum such as using Internet based research, electronic mail, databases and desktop publishing. Likewise, Zakiah' study (2000) revealed that the principals have positive perception towards the implementation of the Malaysian Smart Schools where those principals have a high level of understanding and knowledge on this concept but they have inadequate skills in ICT and computer usage. Therefore, from the above findings, both studies concluded that all of the smart school principals need to improve their ICT skill concerning the use of new critical technologies as well as smart pedagogy to ensure effectiveness and efficiency in the smart school management.

Obviously, teachers must be trained to be skilled and knowledgeable about ICT before they can integrate this new technology in the teaching and learning process. Teachers need to develop an in-depth knowledge of learning and instructional theories so they can apply appropriately into the classroom. Therefore, they have to be continuously involved in various computer courses related to their professional development of being a smart schoolteacher. Teachers have been given exposure to courses like the use of Internet and e-mail, developing websites, monitoring networking system as well as to produce teaching modules in computer forms. All these are directly aimed at equipping teachers with various knowledge and skills in order to be prepared for implementing technology integration in their classrooms (Suzana, 2004).

Based on the above discussions, it can be concluded that teachers are already using computers in the classrooms. The pressure on all teachers to become ICT literate as well as to understand the educational implications of the new technology has become urgent. This is important, as all teachers will have to use ICT as tools in their classrooms. Teachers must improve not only their own general computer skills, but also their skill of computers in the classroom practices, that is their uses of technologies for improving teaching and learning process (Suzana, 2004).

The teachers should also facilitate the use of technology based on the instructional objective(s) being taught. Some of these are:

- Developmentally appropriate (interactive) software that supports instructional outcomes help develop higher-level reasoning and problem solving skills.
- Electronic books benefit young readers and special education students.
- Word processing helps students write more fluently.
- CDs make accommodations for different languages and allow students to hear directions in their own language but require them to read the stories and do word work in English.
- The World Wide Web makes different types of reading materials more accessible to students.
- Virtual Field Trips allow children to travel beyond the classroom without actually leaving.
- Digital Images allow students to record and document their experiences.

(Source: www.teach-nology.com/tutorials/techinclass/1)

Extensively, computer knowledge and skill is essential for all Malaysian students and teachers in moving towards a fully developed nation country by the year 2020. However, introducing computers in education would not achieve the desired results if the teachers who act as facilitators are computer illiterate. Teachers need training not only in computer literacy but also in the pedagogical application of those skills to improve teaching and learning to be more meaningful (Koay, 1999; Robiah and Nor Sakinah, 2003; Suzana, 2004). They need to learn further how to integrate ICTs into their classroom activities and school structure. Apart from that, the school administrators must be educated enough to know what computer technology their schools need and must be willing to make any changes for the future benefit (Kong and Lee, 1999; Zakiah, 2000).

2.5 The Use of Electronic Information Sources and Services

In this Information Age, information needs to reflect the existence of electronic resources (Ray and Day, 1998). To make the learning process more interactive and exciting, teaching materials are not limited to printed books, but also include electronic books, multimedia software, courseware catalogues and databases. Shahar (1998) from the National Library of Malaysia defines IT products as sources of information and knowledge contents which are available in electronic forms such as CD-ROMs, interactive video, films, audio digital products, online publishing, public domain and commercial online databases. Some of the online databases are available through Internet and other propriety databases available through various private network providers. In addition, there are satellite TV programs with varieties of channels which provide information to masses.

Today, Malaysian schools have at various points in time been introduced to various educational technology innovations. However, to examine the level of usage of those sources among teachers in Smart School, the researcher highlights four types of electronic information sources and services namely educational television including other channels for education such as Discovery, Animal Planet, National Geographic; CD-ROM multimedia, Internet and e-mail services. For the purpose of this study, the researcher has focused on two types of CD-ROM Interactive that have been categorised based on the supplier. The first type is CD-RI supplied by the Ministry of Education such as the Teaching and Learning Science & Mathematics in English, CD-RI supplied by the Education Technology Division and CD-RI supplied by the TextBook Division. The second type is bought from the private sector, i.e. CD-RI Smart Education.

The researcher also refers the term Internet to the World Wide Web with two categories, educational web sites and electronic reference sources as follows:

- i. Educational Web Sites; i.e. local educational portal, overseas educational portal, search engine and personal web sites; and
- ii. Electronic Reference Sources; i.e. Electronic Dictionary, Electronic News and Electronic Encyclopedia.

To examine the usage of the e-mail and online discussion among teachers in smart school, the researcher focuses on three means of communication such as e-mail (e.g.: yahoo, hotmail), chatting room and also online forum and discussion.

2.5.1 Types of Electronic Information Sources and Services

Since 1970's, *TV Pendidikan* (Educational TV or ETV) was introduced and schools were acquired the Video Cassette Recorder (VCR) to enable them to record Educational TV programmes so they might be shown at a convenient time. However in early 2001, the Ministry of Education had switched the transmission of ETV programme from RTM2 to ASTRO (Channel 13). ASTRO services are broadcast via MEASAT Broadcast Network Systems Sdn. Bhd. (MBNS) by employing high-powered Ku-band payload of the satellite system enabling the transmission of digital television and radio broadcast direct to users after installing the necessary hardwares. Since then, more schools were installed with the Digital Multimedia System (DMS), bringing the total number of schools having the ability to receive the ASTRO up to 9,000. For ETV programmes, the two types of production are curriculum-based as well as for public education (Rozhan and Hanafi, 2004).

The objectives of this ETV channel are to underline the importance of technology in the development of education among teachers and students, and to enrich the teaching and learning process through creative and innovative use of the various media and technologies. The most important subjects in the school curriculum are featured in ETV

such as Mathematics, Science, Bahasa Melayu and English for both primary and secondary schools. Besides that Islamic Religious Knowledge, Moral Education, History, consumerism, living skills, environment, science and living, safety, technical / vocational subjects and health are also among the topics featured. The schools are also able to access the other channels for education such as Discovery (Channel 50), Animal Planet (Channel 51), National Geographic (Channel 52) and also TV1, TV2 and TV3.

Generally, television is not widely used in classrooms because teachers experience difficulty in previewing videos, obtaining equipment, incorporating programs into the curriculum and linking television programming to assessment activities (Reeves, 1998). Ab. Rahman (1995) confirms this in his study about the use of ETV in teaching learning SSIC Malay Language among students and teachers from six secondary schools in the Kerian district, Perak. He indicated that the quality of the surveyed ETV programmes on the whole was good but teachers have to change their attitude to be more positive towards ETV. Rozhan and Hanafi (2004) also reported that a survey conducted in 2002, noted that the ETV is aired from 9.00 am till 12 noon and is repeated from 1.00 pm till 5.00 pm. The DMS, installation and subscription to ASTRO that is supplied to each and every school is fully borne by the Ministry of Education but the ETV was viewed by 73.5% of schools in the rural areas as opposed to only 25.5% by the urban schools (Educational Technology Unit, 2002).

Besides using television, the use of the digital multimedia technologies has generated a new paradigm in our educational methodologies and strategies. CD-ROM and compact discs (CD) are the most popular multimedia components in education, which have been supplied to all learning institutions. Multimedia can be an effective instructional medium of delivering information because it enables the teacher to represent the information in various media via text, sound, animation, video and images (Neo and Neo, 2004).

Abrizah and Zainab (2004) noted that most urban public schools in the country now have access to the Internet. The Internet as an alternative source of information for assignments and projects was also used to teach higher level of thinking skills such as analysis of information for accuracy and truth. In doing so, the Ministry of Education was setting up a website, MySchoolNet, to help encourage interactive communication between Malaysian school children and students from other countries (Ministry of Education, 2002). An example of such a project is the Ministry of Education with British School Link Project that enables students from four schools in the Klang Valley to exchange e-mail and videoconference with their peers in four Coventry schools in the United Kingdom (Rozhan and Hanafi, 2004).

Several local companies have also established e-learning portals to provide services and materials to students and teachers (e.g. www.portal.com.my and www.tutor.com). Most of these portals offer drill and practise materials to help students prepare for public examinations. However, there are some portals that offer a wide variety of services and materials to help teachers and students learn better and enable the Pilot Schools and parents of Smart School students to access their own schools remotely, i.e. the Smart School's portal or BESTARInet (Ministry of Education, 2003).

Nowadays, schools have been encouraged to connect to the Internet. As reported in *Akhbar Pendidikan Bestari UTUSAN* on Friday, Datuk Seri Hishamuddin Tun Hussein agreed to develop smart partnership between the Ministry of Education Malaysia and France concerning educational factors which involved sharing information resources through Internet and creating ICT-based portal among students in both countries. As such, SMK Bandar Baru Bangi, Selangor was chosen as a pilot program in ICT collaboration with school in United Kingdom (Source: Utusan Malaysia, February 4, 2005).

In Buletin JASA, Tengku Zawawi (1998) clearly elaborated the Internet use in teaching Mathematics. Internet provides services like e-mail, web sites (WWW), Internet Relay Chat (IRC), Telnet, discussion groups (e.g. www.cikgu.net.com), Internet phone, netmeeting, video conferencing, ICQ and File Transfer Protocol (FTP). Koay (1999) also discussed the use of Internet in his study and emphasised on e-mail or electronic mail as one of the fastest means of communication, easy to use and cost very minimal. Besides using e-mail for personal services, the e-mail can be used to send documents, computer files or programs, pictures and many other text and graphics. He clearly added some of the e-mail facilities that can be used by the teacher in the classrooms are:

- communicate internally or with the students, parents and staff
- share and exchange ideas, effective methods of teaching and other related information about education
- receive advice from experts and other technical help
- inform other schools concerning an event or a problem
- using the Internet Discussion Groups as a follow up through the use of e-mail.

(Koay, 1999)

According to Tengku Zawawi (1998), two major components for information retrieval through the Internet are physical access and intellectual access. Physical access particularly includes those computers hardware for students and teachers to access the Internet and its components such as e-mail, gopher, electronic discussion group, file transfer, Archie, Veronica, WAIS and WWW. Besides, users can also find current news, electronic journal or any reading materials through the search engines like www.yahoo.com, www.google.com and etc.

Below are the examples of various web sites for online discussion group, online exercise, mathematics journal and mathematics software available through the Internet:

Online Discussion Group: <http://www.educ.kent.edu/deafed/whahome.htm>

Online Exercises: <http://math.uc.edu/onex/demo.html>

<http://www.geocities.com/Athens/Acropolis/2766/latihan.html>,

Mathematics Journal: <http://www.math.psu.edu/MathList/Journals.htm>

Math Software: <http://forum.swarthmore.edu/~steve/steve/mathsoftware.html>

Undoubtedly, the Internet helps students and teachers to pursue individual interests, take responsibility for gathering their own information and enable them to communicate with any peer or expert. The Internet is used extensively by many teachers and students in Malaysia. Through the Internet, teacher can interact individually with students or their parents and can also increase individual attention. With the use of e-mail, chat rooms, Web cam and a collaborative Web site, the online learning enhance the traditional textbook and give students a personal connection (Ministry of Education, 2003).

It is reported that good electronic teaching materials in Bahasa Melayu are still unavailable over the Internet. However, now Science and Mathematics teachers are able to access the vast resources of Science and Mathematics materials in English available on the internet, for example, GetCyberEd.com, the portal provided by the consortium (Ministry of Education, 2003). In Wee's study (1999) regarding school library use of the Internet stated that Clyde (1995) found teachers can exchange information and ideas on one of the many discussion groups. Teachers also regard professional contact and sharing ideas as the most important mean of communication. Clyde also explained many Australian schools have moved from being resource users to become information providers by creating their own home pages on the World Wide Web.

Williams (2004) conducted a survey on teachers in Indiana high school to assess teachers' awareness of electronic resources and to determine whether their directions influence student use of these resources in the School Library Media Center (SLMC). Her findings revealed that teachers encourage student to use Internet in the SLMC, but most do not direct students to use databases. Teachers consider information from electronic databases to be more reliable and focused, but they say the Internet is faster, easier to use and has a greater scope of information.

In a related study of Internet and CD-ROMs usage, Ray and Day (1998) found that 96.4% of their respondents acknowledge an awareness of access to a network computer via university, although many stated computer availability deterred them from using the resources. The findings suggest many respondents do use some electronic resources and are aware of their benefits. As expected the most popular electronic resources were CD-ROMs and the Internet, with 80.7% and 76.7% respectively of the sample population using them. Contrary to the study by Shaheen and Abazova (1999) about the use of CD-ROM service among academic staff in the International Islamic University, they found the usage was very low, possibly due to lack of awareness about the service, unfamiliarity with CD-ROM searching techniques and deficiency of CD-ROM collection.

2.5.2 Teachers' Usage of the Electronic Information Sources

In the last few years, there were rapid growth of users of new technology applied in library and the growing number of electronic materials in schools. The literature is very limited on Malaysian studies regarding usage of electronic information sources and services particularly in national school level. Studies on how teachers use ICT are mostly included in ICT integration programmes that looked at how teachers have used ICT in teaching specific subjects; how they have employed Internet resources in teaching and how they

have used e-mail in communicating with students and other teachers. Unfortunately, there is a lack of research in the level of teachers' usage of electronic information resources in school, and as a result, there is no clear understanding of how different ICT proficiency influences usage in teaching and learning of all subjects.

Several studies have emphasised a strong need for computer literacy among teachers to benefit the use of computers in pedagogical process. Many teachers in Malaysia seldom adopt ICT in their work and some are even reluctant. Rahimah's study (2001) stated that there is still a shortage of teachers who are competent in ICT although many technical and vocational school administrators in West Malaysia are in favour of the use of ICT in administrative work. This kind of scenario is frightening as it may deter the progress of the implementation of smart schools and the success of Multimedia Super Corridor (Mohamad Rashid, 1987 cited in Rahimah, 2001). She also mentioned Mohd Al Shaari (1995) findings that the use of computers in administration is still lacking eventhough there have been a lot of exposures to the use of computers in teaching and learning in Malaysia.

Other studies have looked for additional variables that have an influence on usage of electronic information sources especially for teachers and students. Siti Zaiton (1998) identified the computer skills as the biggest factor influencing the use of electronic information sources by both students and teachers. In turn, Zakiah (2000) identified reasons why teachers use the computer; they were in need of materials or resources, completion of projects and a source of teaching plan. However, Halimahtun and Nor Azilah (2002) investigated the implementation of computer technology among MRSM teachers and revealed that the integration into the teaching-learning process is relatively poor. The use of computer technology among teachers is very low although training has been given to all of them.

Similarly, Mohd Arif and Norsiaty (2004) conducted a survey among the smart school teachers in the Kuantan district in 2003 and revealed that the integration into the teaching-learning process is relatively poor while the use of smart school teaching courseware and Internet-based is very low. It is surprising that the use of computer lab for smart pedagogy within the first three months of the school operation showed only 24.56% of the teachers' usage. Unfortunately, based on the record of the smart teaching usage, only 16 out of 22 classes used smart teaching courseware while another 6 classes have never entered the computer lab. Suzana (2004) found that the role of School Resource Center in the integration of technology in teaching and learning was satisfactory and most teachers in smart schools in Wilayah Persekutuan Kuala Lumpur and Selangor showed the middle level of technology integration in their teaching and learning.

At the international level, Austin (2004) found that American teachers report on their technology use, pre-service technology education and technology professional development in a new survey conducted by NetDay in April and May of 2004. The Speak Up Day for Teachers online survey was completed by 11,132 teachers in 1,185 schools from all 50 states. Teacher's number one use of technology is to email colleagues, followed by word processing of instructional documents, communication with administrators, record management, and curriculum development research. Approximately the same percentage of teachers felt their school district in-service technology training to be satisfactory (NetDay, 2004 in Austin, 2004). Williams (2004) also highlighted several studies done in the United States regarding teachers' beliefs in technology and its use in the classroom. She concluded that teachers are interested in learning more about technology for educational purposes but majority of them learn computers for their personal uses rather than for teaching-related tasks.

Intan and Shaheen (2005) conducted a survey in Singapore concluded that teachers generally did not use their various information resources and school libraries effectively, mainly due to inadequacy of their school libraries in terms of teaching materials. They also mentioned teachers need to use a variety of electronic information resources in their lessons so as to keep their students interested and their lessons current and informative. In another related study, Shaheen and Abazova (1999) investigated the relationship between computer literacy of academic staff in the International Islamic University Malaysia and their use of electronic information resources. The study revealed that computer literate academics use electronic information sources more frequently and there is a statistically significant relationship between computer literacy and the use of electronic information sources.

The Report on Collaborative Observation on Implementation of Smart School Pilot Project 2001 (Ministry of Education, 2002) noted that smart teaching and learning practice differs in the learning aspects as it provides more freedom to the students in terms of searching for their own information, discussion in groups and trains them to be more independent. The results as shown in the Table 2.5.2 is a survey on technology usage in classroom for core subjects that was conducted on 40 students of Form 1 – 5 from each smart school.

Table 2.5.2: Survey Regarding Technology Usage in Smart Schools

Technology usage in teaching process	B.Melayu %	English %	Science %	Mathematics %
Teacher use SSMS courseware to teach	74.4	66.8	73.3	59.3
Teacher use Internet in teaching	61.6	63.9	51.7	48.8
Teacher use MS Office application in teaching	60.5	50.0	50.6	47.7
Opportunity to use Educational TV & Radio	40.1	46.5	26.7	19.8
Interested in using various technologies	97.7	93.6	95.9	85.9

(Ministry of Education, 2002)

Based on the above data, overall usage of the Smart School Management System (SSMS) courseware is quite high with Bahasa Melayu being the highest among four core subjects. The report revealed that in a few schools, the reasons of not using the courseware effectively were due to tight schedule, the lesson was too short, problems of bureaucracy burdens and the school's principal of not supporting the progress of ICT. Most of the students believed that SSMS courseware could increase their understanding, as it was interesting and made the lesson easier to understand but there were students who are of opinion that the content delivered in the courseware is too simple and not up to the standard expected. The teachers' usage of Internet in teaching particularly in English Language was also encouraging. However, it was reported that most of the students did not have the opportunity to use the Internet during school hours. Only a small number of students were able to use the school's Internet facilities to obtain additional information and to use e-mail services.

The usage frequency of Microsoft Office application was still at minimum level because less than 60% of the teachers used it especially Microsoft Excel. Microsoft Word was used during English and Bahasa Melayu lessons to write notes and essays in the classrooms whereas Microsoft PowerPoint was used to present information. However, the usage of Microsoft Word and Microsoft PowerPoint was said to be unchallenging to the students' skills. As expected, a majority of the teachers do not utilize the Educational TV and radio programs in their teaching process. Only a few schools organized the timetable to follow the programs and some teachers discussed the TV programs with the student before and after watching them. Finally, when asked about the usage of technology in learning, nearly all students stated that they are interested in using various technologies in their classrooms (Ministry of Education, 2002).

It can be said, after four years of implementation, there are many teachers who were still vague on the concept of smart school. As a result, the technology as catalyst was not fully utilized and the level of teachers' ICT skills is considered low. Thus, smart teaching and learning was not successfully practiced as the focus of current teaching and learning was more towards preparing students for the public examination. Hence, without their full support and commitment, the objective of smart school to contribute to the knowledge-based economy and the dream of realizing the Vision 2020 will not be achieved (Ministry of Education, 2002).

2.6 Barriers in Using Electronic Information Sources

Many studies have been conducted on the use of electronic information sources by teachers determine that lack of both confidence and adequate training in the search for and use of online information may continue to be prevalent among many school teachers. The literature suggests these problems exist in the local studies (Siti Hawa, 1998; Wee, 1999; Robiah and Nor Sakinah, 2003; Mohd. Arif and Norsiaty, 2004) and also the international researches (Ray and Day, 1998; Williams, 2004; Intan and Shaheen, 2005) that explore similar situations. Thus, limitations of time for truly meaningful information consideration, as well as the pressures of heavy workload, may force low-quality information selection by the teachers.

The most common use of ICT in classroom teaching was to provide teachers' access to a range of online resources using more advanced multimedia courseware and web based technology. Teachers already using the electronic information sources particularly Internet have identified a number of factors that they regard as barriers to effective use of those sources available in school. Many of the barriers are related to costs, hardware, software

and telecommunications (Wee, 1999). Lack of time was an issue for the majority of the respondents in many studies. Not surprisingly, the lack of interest and confidence by the teachers has been identified as a hindrance to teachers' use of electronic information sources (Siti Hawa, 1998). Other factors that were found to limit teachers' use included inaccessibility, lack of motivation, limited number of resources, inadequate facilities and lack of knowledge concerning how to use the computer (Robiah and Nor Sakinah, 2003).

Ray and Day (1998) noted that limited time and lack of effective information retrieval skills seem to be the main barrier to using electronic information resources. With effective information retrieval skills and knowledge of the most useful databases to search for a specific query, a smaller amount of information is often retrieved and the time spent searching database reduced. However, with more effective search engines and user-friendly interfaces, in-depth information retrieval skills would not be as essential and therefore the time spent using the source would also be reduced (Ray and Day, 1998).

In Williams's study (2004), she reported that teacher's opinions on the use of computer technology in the classroom whereby 191 Indiana social-studies teachers in grades 6-12 identified their greatest barriers to Internet use as lack of access and training. Teachers also expressed distrust of student Internet use, saying it led to plagiarism. She also highlighted a survey of 339 K-12 teachers in West Virginia regarding teachers' experience with computers and their access to the technology affects student use of the Internet. Finally, in a survey of 196 Wisconsin high-school business teachers, she cited limited access to computers as a barrier to teacher use of the Internet because these teachers said they use the Internet as a teaching tool but they feel the need to control or monitor student use.

Based on the Ministry's Collaborative Observation Report in Malaysian Smart Schools Project, some teachers mentioned several factors such as the heavy workload hinder them from implementing the smart teaching and learning effectively. They accepted the smart transition but it was restricted by the examination system needs and thus teachers perceived the traditional teaching and learning helps the students better in preparing themselves for the public examination. Besides, the tight use of smart room / laboratory and the imbalance ratio of computers supplied to the number of students enrolled also obstruct teacher from using the supplied courseware. Furthermore, they also highlighted that the implementation of smart teaching and learning concentrated more on students in Forms 1, 2 and 4 because teachers who teach Form 3 and 5 gave more emphasis towards examination oriented. Mismatch between smart curriculum and the public examination needs and inadequate ICT skills among students and teachers are also considered as problems. Another barrier which most of the smart schools experienced was the power supply disturbance, at least twice a month due to the overload, natural factors, for example lightning and thunder as well as power trip effect from the old wiring system (Ministry of Education, 2002).

The report also stated that most of the teachers believed the smart teaching could be implemented successfully if ICT equipment and facilities supplied are always in good condition. They are more confident of integration ICT in smart pedagogy if knowledge and more training on smart pedagogy are continuously given to them. Generally, various factors influenced teachers' use of electronic information sources but limited time and lack of knowledge were two major constraints for teachers. Other influential variables included the availability and quality of resources, reference sources, rules and regulations governing and standards of behaviour (Ministry of Education, 2002).

2.7 The Concept of School Resource Centers (SRC)

The Malaysian Education Ministry has made concerted effort by incorporating computer technology centered in the School Resource Centers. Schools were then encouraged to provide computers in the SRC for the students' use as well as to assist the SRC teachers in managing their SRC (Chettrilah, 1998). School Resource Center is described as centralized information and technology center designed to support the schools curriculum and provide resources that meet the educational and recreational needs of both teachers and students in the school. Since 1980s, the Ministry of Education had established SRC from the former school library for two significant reasons:

- i. It made possible to the integration of two separate services, the library and the audio-visual services.
- ii. It provided school library with the opportunity to play a more meaningful role in the teaching-learning process in school. (Zaiton, 1980)

Today, the role of the SRC in schools has moved a step further by accepting the challenge of ICT and the sophisticated needs of the users (Chettrilah, 1998). As Singh (1993) in his Ph.D. research regarding an international comparative study of school libraries, noted that school libraries today are no longer traditional reading rooms and study halls; they are evolving to become facilitators of information services and gateways to the wider information world. Thus, school libraries must change into the digital era due to the fact that nowadays information comes in various formats, no longer confined to publish materials like books and magazines. As such, Mohd. Nasir (2003) defines **School Resource Center Digital Era** as an electronic resource center with the collection managed by the automation resource center system stressing on accessing varieties of information through networking.

2.7.1 The Development of School Resource Center in Malaysia

It is really the Malaysian government's intention that ICT be an important vehicle in the dissemination of knowledge in school resource centers to enhance and prepare students for the knowledge-based economy in this country towards the international global. Kaur (1995) discussed regarding an evaluation of the *Pusat Sumber Ilmu* Project (PSi) in a school. As one of the government's efforts, a joint committee comprising the MOE and the Malaysian Institute of Microelectronics System (MIMOS) conducted a Computer-in-Education (CIE) Programme. This pilot project was launched during the 1991/1992-school term whereby each of the sixty secondary schools involved in this project was equipped with 21 computers. COMIL or COMputer Integrated Learning System was specifically designed and developed as an indigenous authoring system to provide three different types of software; an authoring tool, a database programme and a networking application. This project involved setting up a library equipped with a nationwide computer network, which would allow students to access information from a central database (Kaur, 1995).

Chettrilah (1998) elaborated another joint council project namely the National Education Network or *Jaringan Pendidikan* on 14 June 1994. The project involved fifteen secondary schools nation-wide linked to the Internet via Jaring, the Malaysian gateway to the international computer networks with the main objective to provide opportunities for teachers and students to communicate, access and share a variety of information through the use of computer and telephone lines. Another objective is to enable Malaysian secondary school students to communicate and exchange information with thousands of students from all over the world via the computers; hence, making the standard of education in Malaysia on par with those in developed countries. The network will also allow students to access information from government departments and research centers.

The Electronic Resource Centers or *Pusat Sumber Elektronik* concept for Malaysian schools and institutions was introduced in 1996 represents an effort by the Ministry of Education to computerize the catalogues of the fourteen school resource centers and connect to the Internet. The former Minister of Education, YB Dato Seri Najib Tun Razak who is currently the Malaysian Deputy Prime Minister, launched it on 18 March 1996. This concept was tested in fourteen selected secondary schools through a pilot project called Munsyi Network and each school had been connected with wide area network (WAN) supervised by MIMOS. The school had a local area network (LAN) of computers with a server being connected through Jaring to the database of the Division of Education Technology and Telekom Malaysia (TM) contributed to the computer networking (Wan Hamzah and Ab. Rahim, 1998).

School library automation started nationwide only in the late 1990s when IT is making rapid inroads into Malaysian schools due to the inception of the Smart School concept. Tee and Abrizah (2005) conducted a study to determine the current status of library automation in Malaysian Chinese Secondary Schools (MCSSs). They revealed that the MCSS libraries started to automate during the 1990s and have been actively involved in library automation projects since 2000. Abdullah et al (2002) as cited in Tee and Abrizah (2005) indicate that the reasons given for automating a school library cover aspects such as school library management, school and library efficiency, curriculum support, information access, information skill instruction, public relations, facilitating collaboration and promoting equity. Educational benefits derived from the automation of library functions include opportunities for students to develop information skills, to achieve greater success in locating resources, and to become independent and life long learner.

The recent development on School Resource Center showed the need to automate the function of SRC in the near future. As reported by Azmy (2005) in Utusan Malaysia, the General Director of Education Technology Division (ETD), Datuk Yusoff Harun launched the automation system software called Integrated Library Management Utility (ILMU). By automating the school resource center using this software, quality of management, services and client satisfaction could be improved. He also reported that ETD Chief Assistant Director, Education Resource and Service Sector, Hjh. Fatimah Jusoh has recognised this automation software in processing materials, information searching and bibliographies through networking because it is much easier compared to manual processing. (Source: Azmy Mohamed, Utusan Malaysia, 8 August 2005)

2.7.2 Need on Developing Digital Libraries / School Resource Center

The term “digital library” began to be heard in the early 1990s, as universities and other institutions began to build discipline-based access to these collections through local and wide area networks. The Digital Library Federation has proposed the following definition:

“Digital Libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities.”

A digital library, like any library, is a service, which is based on principles of selection, acquisition, access, management and preservation, related to a specific client community. It is used interchangeably with terms such as virtual library, electronic library and a library without walls (Edzan and Abrizah, 2004). The “virtual library” is the library without walls whose major resources may be examined on a computer. Almost all libraries of any size these days have web sites. In particular: Dissemination of information can be reflected on

the Web through the following: internal search engines, online reference service, stable links, to other Internet sites, access to the online catalog and other databases, basic information about the library and timely updates. Perhaps the most important of these is access to the online catalog of the library's local collections (Stover, 1997).

As far as library automation is concerned, the findings of the study of Tee and Abrizah (2005) could provide information for policy makers to identify what needs to be done as the preparation towards developing digital SRC. This includes which systems to choose or what software is available in the market. According to the IFLA/UNESCO School Library Manifesto (2000), "school libraries must have adequate and sustained funding for trained staff, materials, technologies and facilities". On the other hand, school libraries only receive a small annual budget for library resources and operation, and this does not include library automation work. The key factor is the overall costs of the automation project, which also include the system, hardware and software maintenance, retrospective conversion and staff training.

In order to develop such a virtual library, we need to know how to do web pages. Katz (2002) explained most of the online reference libraries, i.e. "virtual library", begin with a page, which briefly indicates what is available. Major sections and subdivisions are reached through standard links, which the number depends on divisions and single site available. In doing so, Chan (2001) noted that a report dated September 2001 showed some 300 teachers from 157 schools (about 50% of the schools in the state) have been trained in web page development and some 100 schools have uploaded their web pages.

Definitely, in moving towards digital era, the first thing to do is to identify the materials to be digitized and a decision has to be made whether the digitization projects will be carried out in-house or to be out-sourced. This will depend on various factors such as the scope of

the project, the manpower available, the proper hardware and software, the expertise to carry out in-house as well as the available budget (National Library of Malaysia, 2004). Shahar (1998) discussed the planning of the Malaysian's government to transform the country into digital nation and the major role of libraries in making ICT product and services easily accessible to the community. It was through the Computer-in-Education and the *JARING PENDIDIKAN* (Education Network) project that had linked about 50 selected schools to Internet. With the changing education system toward ICT-based, by the year 2020, it is expected that everyone who goes through the school systems will be computer literate and be prepared for technologically inclined job market.

Recent years have seen a steep rise in the number of digital library initiatives across the world (Abrizah and Zainab, 2004). High levels of attention and funding were first given to digital libraries in the early and mid 1990s, which led to a booming era with large number of visions and projects. Some fine examples of digital library initiatives that currently available on the World Wide Web are: The Library of Congress American Memory, United States, National Science Foundation's Digital Library, Canada's SchoolNet Digital Collections and The New Zealand Digital Library. In Malaysia, special committee at the National Library of Malaysia was undertaking plans for developing nation-wide digital library. As part of the MSC initiatives, MyLib is the pilot project for the larger National Digital Library Initiative and it is intended to promote the economical and efficient delivery of information and knowledge to all levels of the Malaysian society. MyLib web site is a web portal that provides almost all of the services such as e-mail, forums, and search engines including e-commerce features.

Another digital library project implemented in Malaysia was the International Islamic Digital Library portal (IIDL). The idea of developing an IIDL was discussed at the Annual Meeting of the International Advisory Panel of the Multimedia Super Corridor in 2001. Dr. John

Gage of Sun Microsystems and the former Honourable Prime Minister, Tun Dr. Mahathir Mohamed discussed the possibility of Malaysia taking the lead in setting up an IIDL. It is an online database of Islamic information (<http://www.iidl.net>), that was stored in digital forms consisting of materials in various forms such as text, audio, video, images and others. The IIDL will be a digital repository of the Islamic knowledge that linked to other knowledge repositories to enrich its body of knowledge. Nine major institutions and libraries with substantial collections on Islam participated in this project with the National Library of Malaysia (NLM) as Coordinator and the Multimedia Development Cooperation (MDC) as Advisor. The IIDL portal was successfully showcased at the 10th Session of the Organisation of Islamic Countries (OIC) Summit Conference held at the Putrajaya Convention Center, Putrajaya, Malaysia from 11–17 October 2003.

Abrizah and Zainab (2004) mentioned that most of the existing digital libraries grew from grassroots efforts of teachers, students and scientists working collaboratively to create a library of educational resources and services to support teaching and learning. They claimed that their project, Collaborative Resource Development (CoreDev), is one of a number of repository architectures that have been proposed over recent years for use in various digital library initiatives. CoreDev aims to provide an electronic system to help educators as well as students to obtain information on local history; collect, store and organise information in digital format; publish and share electronic resources; learn how to use ICT to obtain historical information. In Edzan and Abrizah's study (2004), they described the conceptualisation of a model for a collaborative digital library specially tailored for Malaysian secondary schools, which will support classroom teaching and learning. This concept of a Malaysian digital library is in line with the government's efforts in establishing Smart Schools Project. However, various issues such as identifying local resources, ascertaining the needs of its users, and establishing a framework to meet these needs, must be addressed before the digital library can be fully implemented.

2.8 Summary

The impact of the use of ICT in education is determined through surveys and research and thus, serves as basis for the formulation of national indicators. The use of ICT in the school system in the Asia-Pacific Region, as in the other regions of the world, is widespread and continuously growing. Many believe that ICT will empower teachers, transforming teaching and learning processes from being highly teacher-dominated to student-centered. There have been several initiatives undertaken to measure the impact and use of ICT in education in Malaysia, the creation of the Smart School System serves as benchmark for ICT integration in schools. It focused on the use of ICT in curriculum, in pedagogy, in assessment and materials.

This study is designed to examine the usage of electronic information sources among teachers in smart schools. Based on the literature review, it is imperative that studies be made to investigate the teachers' attitudes towards ICT since the technology, as enabler will help them in disseminating current information to the students. It has shown that the current usage of the electronic information sources in the Smart School classrooms and also school resource centers rely upon the teachers' effort to design meaningful technology-integrated lessons. In many cases, it is found that even though the teachers may have had the knowledge and skills in technology, their level of integration is relatively low. Obviously, the teachers need to cultivate a positive attitude towards ICT and its use to attain the desired results in integrating ICT in education. In fact, despite annual technology improvement expenditures of hundreds of thousands ringgit, we are still trying to create resource-rich classrooms with full commitment from the teachers and school management.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The purpose of this study is to examine the usage of electronic information sources by the teachers in Malaysian secondary smart schools. Six research questions are developed to act as a guide in completing this study pertaining to the level of ICT knowledge and proficiency among the teachers as well as the types of electronic information sources used by them in teaching and learning processes. A focus is given on the teachers' ICT skills and the usage of electronic information sources, whether these sources are fully utilised in teaching and learning processes. This study also identifies the teachers' perceptions towards the computer and information literacy skill amongst students and ascertains the need of developing their own digital school resource center (SRC). The barriers in using the electronic information sources in teaching and learning processes are also highlighted.

This chapter describes the methodology used to conduct the study. Specifically, it is divided into six sections i.e., research design, research instrument, pilot survey, population and sample, data collection procedure and data analysis.

3.2 Research Design

This quantitative study is designed to use the empirical and descriptive methods employing a survey research to examine the level of usage of electronic information sources among teachers in secondary smart schools. Generally, the quantitative method has been widely used in social science research because it is assumed to be constant across time and setting. The findings of the quantitative research are replicable and can be generalised to the general population of the sample used (Gal, Borg and Gal, 1996).

A teacher's questionnaire is the primary source of data for this study. According to Mohd. Majid (1994), a questionnaire survey method allows for a wider spread of samples and the use of questionnaire to gather information had been effective since the collection of data can be done in a short period of time. Survey research also allows generalisations to be made about characteristics of the entire population being studied. This study uses questionnaires delivered by hand and this according to Fouche (1998) has an advantage of saving time, raising response rates because of personal contact from the respondents after completion. This method usually results in better response rates than a mail survey. As the respondents in this study consisted of the researcher's accessible colleagues at smart schools, the researcher was of the opinion that hand delivered questionnaires could be easily distributed and collected personally. The researcher merely distributed the questionnaires personally to every school involved in this study. While visiting each participating schools, the researcher has taken initiative to observe and supplement data regarding the background information on the smart school facilities.

3.3 Research Instrument

The instrument used in this study was developed by the researcher's own testing instrument with the supervisor's approval after examination of similar studies that identified variables considered important in the description of electronic information sources and the teachers competency of ICT. A few references particularly a designed questionnaire administered by Robiah and Nor Sakinah (2003) on the aspect of use of ICT in education was adapted for use in this study. The questionnaire was designed to identify the level of usage of electronic information sources among teachers in secondary smart schools. It also addressed the teachers' perception towards computer and information literacy amongst students and what teachers perceived in developing digital school resource center.

In designing the questionnaire, the researcher also referred to the *“Laporan Pemantauan Kolaboratif Pelaksanaan Projek Rintis Sekolah Bestari 2001 - Bahagian Sekolah Kementerian Pendidikan Malaysia (Januari 2002)”*. The researcher determined most of the important variables in this study based on this report regarding Smart School Pilot Project, such as the core subjects teaching, computer courses organised for teachers, types of electronic information sources used and barriers in using electronic information sources among teachers. For the purpose of this study, electronic information sources are defined as those materials used by teachers for information seeking and collection such as CD-ROMs, Educational TV, and Internet including online encyclopedias and related educational portals.

Two survey instruments were used to achieve the research objectives of this study:

- Questionnaire I – a written questionnaire for the teachers. All questions except one item in Section D were close-ended questions. There was an open-ended question in item 16 that aimed to view respondents' ideas and comments in their own words. This set of questions was drafted in Malay language, the medium of instruction in all national secondary schools in Malaysia. The researcher had also translated the questionnaire in English Language (see Appendix A).
- Questionnaire II – a set of questions designed to elicit the background information of the school environment and facilities. The question form was obtained from Selangor Education Resource Center regarding the computer facilities and hardware in Smart Schools. The researcher had filled in the details as shown in Appendix E that listed the computer hardwares available at eleven Smart Schools in Selangor as at 30th July 2005.

A majority of the Questionnaire I was formatted in multiple answer and also a measure of agreement or disagreement by using primarily five-point of Likert-type questions which focused on topics related to teachers and students' computer literacy and also information on barriers in using electronic information sources. The scale of 1 – 5 represents the measure of:

1 – Strongly Disagree

2 – Disagree

3 – Undecided

4 – Agree

5 – Strongly agree

Questionnaire I comprised of 18 questions, which are divided into five major sections as follow:

- Section A: Respondents' information background
- Section B: Respondents' computer literacy skill and ICT proficiency
- Section C: Usage of Available Electronic Information sources in teaching and learning process in school.
- Section D: Teachers' perception towards the information literacy and computer skill among students and teachers' view on digital school resource centre.
- Section E: Barriers in using electronic information sources.

3.3.1 Section A - Respondents' Information Background

In this section, the researcher identified the background of respondents in order to evaluate basic demographic information. The respondents were asked to state their gender, age group, ethnicity, current position in their school, teaching experience, current teaching class and current core subject teaching.

3.3.2 Section B - Computer Literacy Skill and ICT Proficiency

There were four main questions in this section particularly related to computer literacy skill and ICT proficiency amongst respondents. The researcher aimed to know whether the respondents have attended any computer courses organised by the Ministry of Education under Teacher Education Division. The computer skills were studied by the frequency of computer usage and the ability of the respondents to use selected software programs. The level of computer proficiency of the teachers was studied by item 9 of the questionnaire. It required respondents to state their own level of ICT skill according to basic skill, moderately competent, competent or very competent. This is to assess the ICT level amongst those teachers in smart schools. Attempts to identify teachers' competencies in handling selected computer programs were done by using items 10 and 11 of the questionnaire. Respondents were required to indicate the level of competencies in using Software Applications as well as Language Programming. In order to determine ICT skill and proficiency among teachers, they were given 3-point of scale as follows:

- 1 : Not competent - Does not know how to use and operate the software application.
- 2 : Moderately competent - Has basic skill on how to operate the simple computer application and knows how to use the software.
- 3 : Competent - Has advance knowledge and skills on how to use software application.

The aim for studying computer skills amongst teachers was that the current trend in information seeking which required high levels of computer literacy. Teachers who were directly involved in the role of information provision should possess these ICT skills in order to train and give exposure to their students in the classrooms. These Software Applications and Language Programming are two main items to be examined whether the teachers are really competent and technologically experienced of using ICT in smart schools.

3.3.3 Section C - Usage of Available Electronic Information Sources in Teaching and Learning Process in School.

This section focused on the usage of available electronic information sources in teaching and learning process in school. The researcher listed four types of electronic information sources, which are discussed further in the Literature Review, namely:

- i. Educational Television (TVP) – ASTRO Channels
- ii. CD-ROM Interactive (CDRI)
- iii. Internet – World Wide Web
- iv. E-mail and Online Discussion

Specifically, the researcher wanted to know the teachers' awareness and frequency of using the above electronic information sources in teaching and learning processes. In order to determine level of usage among those teachers involved in this study, the scale is given in a range of 1 – 3 as follows:

1. Never - **ZERO USAGE** in the teaching and learning process.
2. Some of the time - Usage of at least **ONCE A MONTH** in the teaching and learning process.
3. Most of the time - Usage of at least **ONCE A WEEK** in the teaching and learning process.

Indeed, this is the major part of the research study that may reveal the current level of usage of those particular items. The respondents have to clarify whether they have used all the particular sources at least once a week, once a month or have zero usage in their teaching and learning process.

3.3.4 Section D - Teachers' Perception towards Information Literacy and Computer Skill amongst Students and Teachers' View on Digital School Resource Center.

In section D, the respondents were asked about their perception towards information literacy and computer skill amongst their students. They have to measure the degree of agreement or disagreement by using the five-point of Likert-type questions for the given twelve statements pertaining to the students' competency in using computer in classrooms. The respondents were also asked about their views on digital school resource center whether they agreed or not to set up digital SRC according to online basis. They were given an open-ended question to write down their suggestions on how to increase the usage of current SRC as well as preparation towards the setting of digital SRC in the future. They were required to indicate the degree of agreement or disagreement using Likert-type questions for the statements given on preparation towards the setting up of digital SRC in their schools.

3.3.5 Section E - Barriers in Using Electronic Information Sources.

This section has only one question, which meant to answer the research question on the barriers in using electronic information sources amongst those teachers. Again, the respondents were asked to express their degree of agreement or disagreement using Likert-type questions based on eight problem statements that might arise and hinder the usage of electronic information sources in their schools.

3.4 Pilot Survey

The pre-testing of a measuring instrument consists of trying it out on a small number of persons with characteristics similar to those of the target group of respondents. The pilot study must take all heterogeneous factors into consideration. It can alert a prospective

researcher to possible unforeseen problems that may emerge during the main investigation (Strydom, 1998). As such, a pilot study of the survey questionnaire was conducted on 40 teachers to pre-test the questionnaire items and to ascertain the clarity of the instrument. This is a process whereby the research design for a prospective survey tested with the purpose to investigate the feasibility of the planned project and bring possible deficiencies in the measuring procedure to the fore (New Dictionary of Social Work, 1995).

Prior to this, two experienced researchers from Selangor Education Resource Center scrutinized the questionnaire to identify any weaknesses and to offer suggestions concerning the instrument's content validity. After making the appropriate changes, the questionnaire was field tested with secondary school teachers in Klang and Shah Alam districts to identify any additional changes and verify that participants could understand and interpret the questions correctly. Table 3.4.1 below shows the schools involved in the pilot survey:

Table 3.4.1: Pilot Survey Participants

NO.	SCHOOLS	PARTICIPANTS
1.	SMK Kampong Jawa, Klang	10
2.	SMK Jalan Kebun, Klang	10
3.	SMK Batu Unjur, Klang	10
4.	SMK Bukit Kemuning, Shah Alam	10

Based on the comments and the confusions voiced out by the respondents during the pilot study, the researcher then altered and improvised the questionnaire items with a clear guideline by the supervisor. Few changes were made as a result of the field test and these included the term how frequent the usage of electronic information sources in teaching

and learning process. Most of the respondents were confused with the term “frequent” used in answering the question. Therefore, it was changed and categorised into specific terms. “**NEVER**” indicates that the teachers have ZERO USAGE for the electronic information sources in teaching and learning process. “**SOME OF THE TIME**” means they have used at least ONCE A MONTH and “**MOST OF THE TIME**” refers to the usage of at least ONCE A WEEK in teaching and learning process. The researcher also made some corrections on the language pertaining to the instructions in section D in order to simplify the sentences for easy understanding. The supervisor then reviewed the revised questionnaire to ensure readability and verify content validity.

3.5 Population and Sample

The population of this study consisted of all teachers in twelve secondary smart schools located in the state of Selangor. The primary reason for the selection of this particular group of teachers was most of the teachers have undergone the computer courses conducted by the Ministry of Education particularly the Teacher Education Division and also Education Technology Division. Furthermore, this study is confined to the secondary teachers in current Malaysian smart schools due to the fact that these schools were provided with sufficient infrastructure of technology integration particularly for the teaching and learning purposes. Each of the schools was operated by the Smart School Management System (SSMS) and thus the school culture was transformed from a memory-based one to an informed, thinking, reactive and caring one, through leading-age technology.

The population has been stratified based on the data provided by Selangor Education Resource Center under Smart School Division as at 30th June 2005 (see Appendix B). Currently there are twelve secondary and two primary smart schools in Selangor. The

researcher has included only secondary smart schools for this study within a reasonable period of time and with limited financial resources. Each of the selected school is situated in different districts in the state of Selangor representing the whole Selangor including two smart schools in Putrajaya. However, the smart school in Cyberjaya could not respond to the questionnaires due to major technical problem on the SSMS, the Smart School Management System. Despite agreeing to participate initially, the Information Technology Co-ordinator returned the set of questionnaires to the researcher without answering any of them. Finally, the researcher gathered data from 25.7% of 942 total teachers from eleven secondary smart schools in Selangor.

This study used a cluster sample of teachers in four subject areas particularly those who are teaching the core subjects: Bahasa Melayu, English Language, Science and Mathematics. Based on the Ministry of Education's report, coursewares for those subjects were developed according to specifications in the national curriculum. The researcher has decided to select five teachers for each of the above mentioned subjects. In the event of unavailable teachers for these four subjects, the researcher has to distribute the questionnaire to the teachers who teach other subjects too. The teacher librarians or SRC Co-ordinators and Information Technology Co-ordinator were also included in the sample. A total of 22 questionnaires were administered personally at every school involved. The respondents were determined based on the choices made by the school administration with the help of the Senior Assistant I (*Penolong Kanan* or *PK1*) and Information Technology Co-ordinator of each smart school. After given a certain period of time to answer the questionnaire, i.e. between two to three weeks, the researcher managed to collect 228 questionnaires from the total number of respondents involved. Out of eleven smart schools, only six schools fully participated with 100% return rate. This figure constituted a total of 94.2% of overall return rate for the survey. Table 3.5.1 shows the study's total population and the sample size.

Table 3.5.1: Participating Schools

NO	SMART SCHOOL	TEACHER POPULATION	SAMPLE SIZE	RESPONSES	RESPONSE RATE (%)
1.	SMK Sungai Pusu, Gombak	73	22	22	100
2.	SMK (P) Sri Aman, Petaling Jaya	75	22	22	100
3.	Kolej Islam Sultan Alam Shah, Klang	91	22	22	100
4.	Sekolah Alam Shah, Putrajaya	75	22	22	100
5.	SMK Bandar Baru Bangi	97	22	22	100
6.	SM Agama Persekutuan Kajang	72	22	22	100
7.	SMK Sungai Besar, Sabak Bernam	131	22	21	95.5
8.	SMK Telok Datok, Banting	89	22	20	90.9
9.	SMK Putrajaya 1, Putrajaya	89	22	20	90.9
10.	SM Sains Kuala Selangor	69	22	18	81.8
11.	SMK Kuala Kubu Bharu	81	22	17	77.3
TOTAL NUMBER		942	242	228	94.2

3.6 Data Collection Procedure

Permission to carry out the research was sought from various parties after thorough discussion with the supervisor. Once the research proposal of this study had been approved by the Vetting Committee of the Faculty of Computer Science and Information Technology, University of Malaya, the researcher immediately made an application to the Education Planning and Research Division (EPRD) of the Ministry of Education to seek permission to conduct the research (see Appendix C). Once permission was granted, the researcher proceeded to obtain permission from the Selangor Education Department to carry out the study in the selected secondary schools in Selangor (see Appendix D). All participating schools' particulars were initially identified based upon the latest data as at 30th June 2005 which was released by Selangor Education Resource Centre under Smart Division.

Besides obtaining approval from the relevant authorities, approval from the principals of the respective schools was also sought. Each principal was contacted by phone to request permission to conduct the study and to identify the appropriate time for data gathering. Next, an introductory letter and permission form was submitted to the school principals requesting permission to conduct the survey in their schools. The researcher personally visited those schools to seek approval for administering the questionnaires and all requests were referred directly to the school principals. Upon receiving permission, introductory phone calls were made and follow-up phone calls as well as school visits were conducted to ensure the smooth running of the survey research. The Senior Assistant I (*PK1*) administered the teacher questionnaires within two to three weeks for every school. In order to gain better response rate, some of the respondents were given more than a month to complete the set of questionnaire.

3.7 Data Analysis

The data from the responses were numerically coded and then entered on to a spreadsheet which was then imported into and analysed using Statistical Packages for the Social Science (SPSS) software program version 13 for Windows. Programs were run to obtain frequencies, descriptive statistics, percentage, mean and standard deviation. Then the findings were synthesised and presented in figures, tables and narrative form. The data were also analysed using cross tabulation tables to identify basic demographic information and patterns as addressed in question 1 to 6. Descriptive analysis was used on the quantitative data collected to examine the relationships and differences among the variables identified in the survey and to address the research questions. These variables included age, gender, ethnicity, current core subject teaching, the ICT competency and skill of the teachers, types of electronic information sources used by the teachers and the level of usage for the respective sources.

Frequency tables were used to identify level of ICT knowledge and proficiency of the study's participants in response to the study's first research question. Those were addressed in questions 8, 9, 10 and 11 in section B. Cross tabulations were used to analyse the relationships between different variables examined in the different research questions. Questions 12, 13 and 14 in section C addressed the research question two and three while the information in section D as stated in questions 15, 16 and 17 addressed research question four and five. Finally, the information identified in question 18 in section E addressed the sixth research question. Information from the open-ended sections of the survey instrument was analysed as stated by the respondents, translating where necessary and then categorised based on key words and concepts.

3.8 Summary

Chapter 3 has provided a description of the study's basic methodology and its various components. It was a quantitative study designed to identify the usage of electronic information sources among teachers in Malaysian smart schools with some qualitative data collected to supplement and help interpret the quantitative data. It also examined how teachers perceived their students' information skill in using ICT integration in smart schools. The population was composed of secondary teachers from eleven smart schools in the state of Selangor. Each participant completed a questionnaire designed to identify how frequent their usage of electronic information sources in teaching and learning process in school. Chapter 4 provides an analysis of this study's findings, while Chapter 5 provides the discussion of the findings and recommendations for practice and further research.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

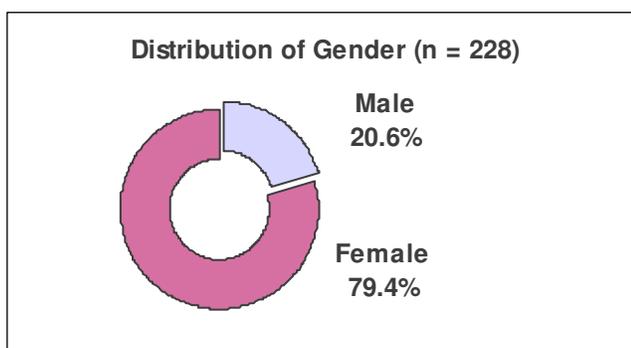
4.1 Introduction

The study examines the level of usage of electronic information sources by the teachers in Malaysian secondary smart schools as well as their level of computer skills and ICT proficiency. This chapter presents the results of the data analysis and discusses the findings. The discussion particularly focuses on types of electronic information sources being used and whether these sources are fully utilized in the teaching and learning processes. This chapter is organized into four major sections. The first part of this chapter reports the respondents' demographic attributes. The second section looks into the computer proficiency and analysis of ICT competency among respondents. Findings of the research questions and the results are discussed in the third section. Finally, other findings concerning the comments given by the respondents regarding a digital school resource center (SRC) are reported in the last section.

4.2 Analysis of Respondents' Demographic Attributes

Out of eleven secondary smart schools in Selangor with a total population of 972 teachers, only 242 were selected to respond to the study. However, the response rate was 94.2% where $n = 228$ teachers involved. This was sufficient for the study. The demographic variables used in this study were gender, age group, ethnicity, current position in their school, years of service in teaching profession, current teaching class and current core subject teaching. From the total number of respondents, 47 responses were received from males (20.6%) and 181 females (79.4%) as depicted in Figure 4.2.1.

Figure 4.2.1: Gender of Respondents



The distribution of respondents according to age as shown in Figure 4.2.2, were 15.8% thirty years and below, 48.7% were between the age of 30 and 39, 32.9% were between the 40 – 49 years of age while 2.6% were in the category of more than 50 years. The finding shows that majority of the teachers involved in this study (n = 111) were at the age of 30 – 39 years. Most of the respondents (n = 200) were Malays. They made up 87.7% of the respondents while the remaining 7% and another 3.9% were Chinese (n = 16) and Indians (n = 9) respectively. In addition, 1.3% fell under the category of other races (n = 3), who were Punjabis and also a Bidayuh. As such the findings were somewhat expected (see Figure 4.2.3).

Figure 4.2.2: Age Group of Respondents

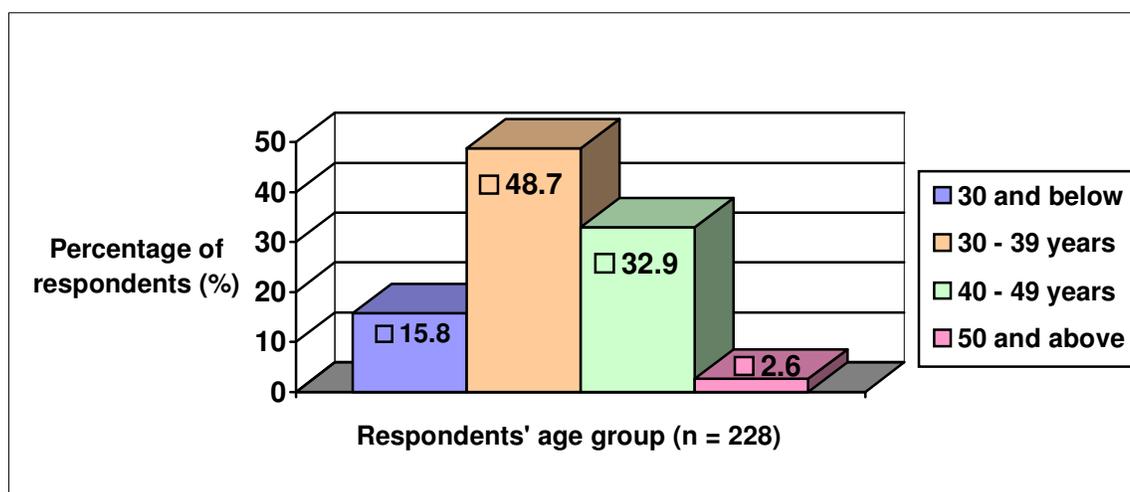
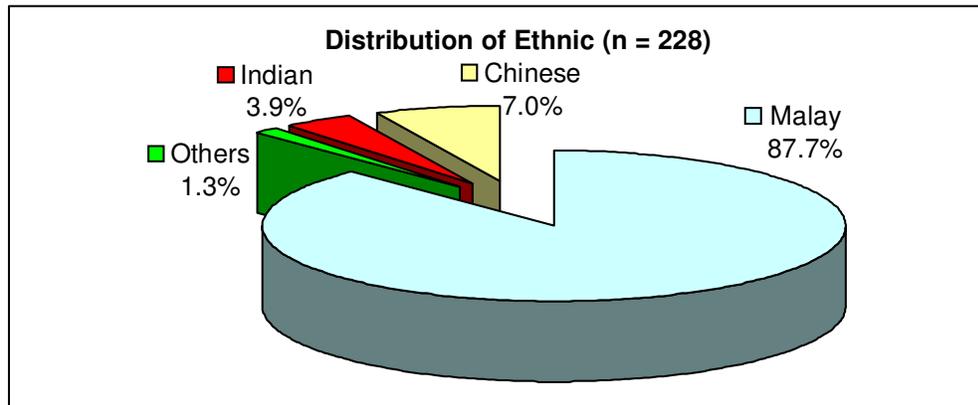
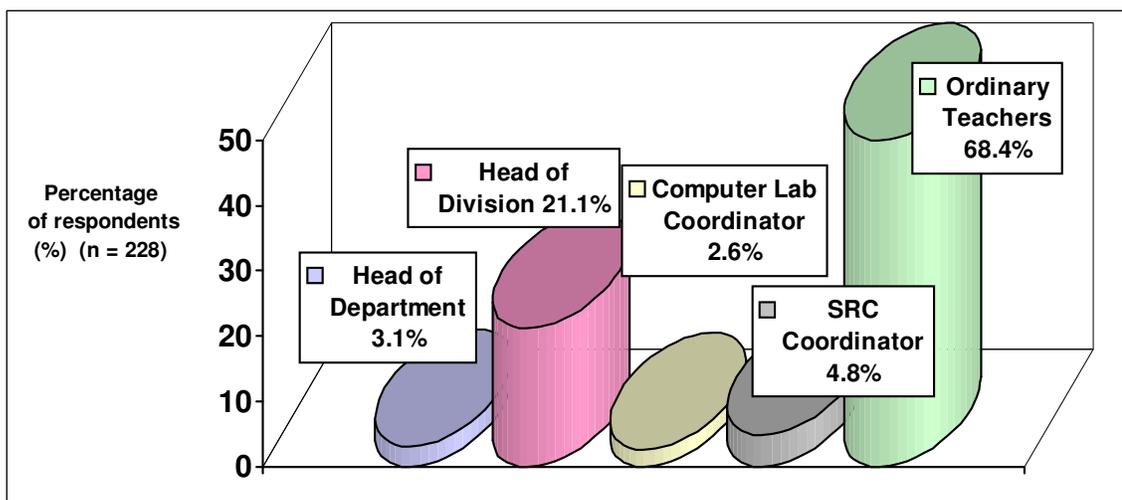


Figure 4.2.3: Ethnicity of Respondents



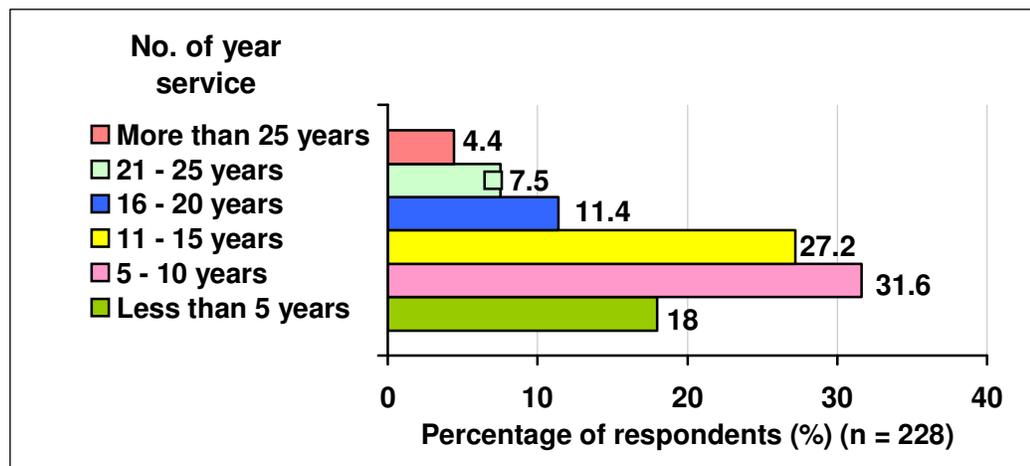
The teachers were asked to indicate their current position in the school whether they are the Head of Department, Head of Division or Coordinator for Computer Lab or School Resource Center. However, 68.4% (n = 156) of the teachers stated that they were under the category of ordinary teachers. These teachers have responsibilities as class teacher, subject teacher and also involved in co-curricular activities. Figure 4.2.4 shows the respondents' current position in school.

Figure 4.2.4: Current Position of Respondents



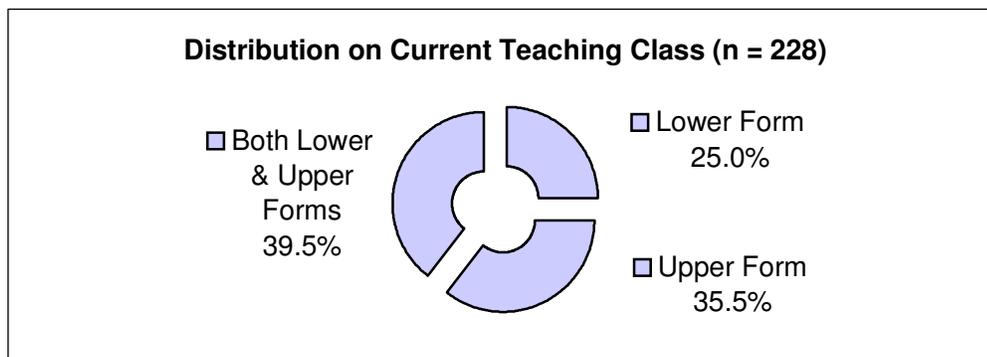
The respondents' teaching experience ranges from less than five to more than twenty five years with a mean of 2.72 (SD = 1.331) as depicted in Figure 4.2.5. The analysis revealed that 18% (n = 41) of the respondents have less than five years teaching experience, 31.6% (n = 72) have between five to ten years and 27.2% (n = 62) have between eleven to fifteen years of teaching experience. Only 11.4% (n = 26) have between 16 – 20 years while 7.5% (n =17) have served for 21 – 25 years in the teaching profession. Another 10 teachers (4.4%) have served more than twenty-five years in teaching profession. This shows that majority of the respondents were experienced teachers as they had more than five years of teaching experiences.

Figure 4.2.5: Teaching Experience of Respondents



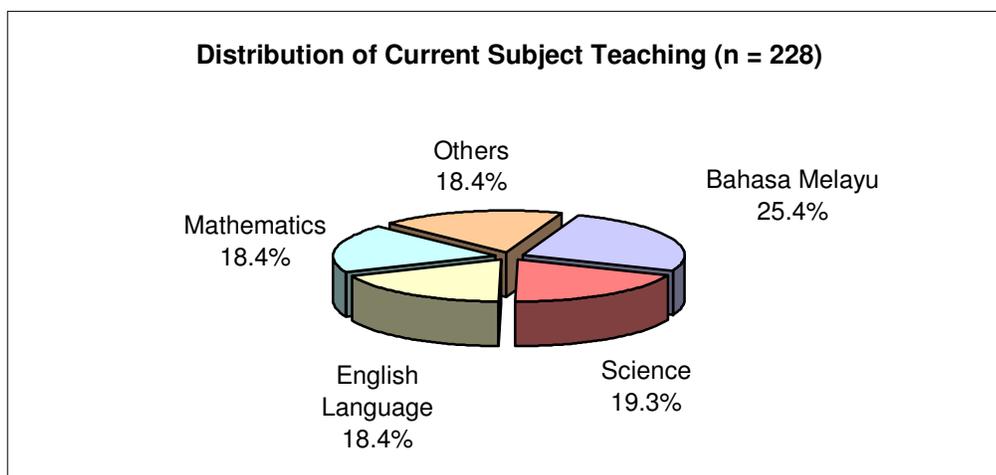
The analysis reported that 39.5% of the teachers were mostly teaching both lower form and upper form, while 25% were teaching Form 1 to Form 3. Another 35.5% were teaching upper forms (Form 4 - Form 6). This clearly shows that a majority of upper forms' teachers are mostly involved in this study. The current teaching classes are presented in Figure 4.2.6.

Figure 4.2.6: Current Teaching Classes of Respondents



It was found that the highest percentage was of those teaching Bahasa Melayu (25.4%), followed by Science (19.3%) while English Language and Mathematic was 18.4% each. Initially, teachers in the smart schools were trained in the use of electronic teaching and learning, area networking and courseware development for these four subjects. However, the respondents teaching other subjects (18.4%) were also making the initiatives to use the electronic information sources in their teaching and learning process such as Information Technology, Arabic Language, History, Geography, Accounting and etc. This is due to the government efforts in enhancing the teaching-learning materials by developing courseware for nine additional subjects and spreading existing courseware to all schools. Figure 4.2.7 summarises the respondents' current core subject teaching.

Figure 4.2.7: Current Core Subject Teaching of Respondents



4.3 Teachers' Level of ICT and Computer Skills

The respondents' familiarity in the use of computer and their involvement in the computer literacy program were looked into in detail. This part encompasses the computer courses organized by the Ministry of Education under Teacher Education Division, which they have attended before. The respondents have to state their current level of ICT skills as perceived by them, and also their level of computer knowledge in software application and language programming.

Table 4.3.1: Respondents' Attendance of Computer Courses

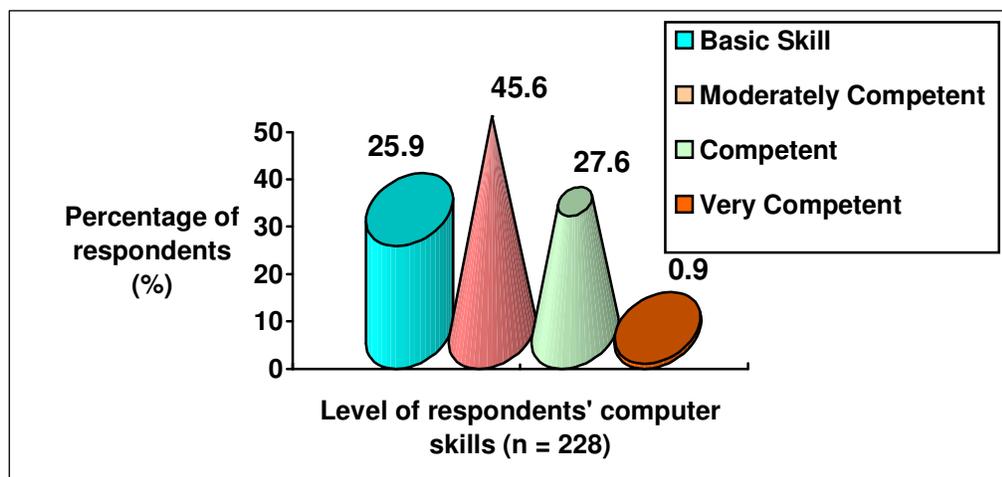
Computer Courses:	Frequency	(%)
1. In-house Training	123	53.9
2. TLM Courseware Application Course	64	28.1
3. Other Courses Organized by Schools	39	17.1
4. In-service Training (14W / 12W)	25	11.0
5. Teacher Training Course	11	4.8
6. Induction Course Package	8	3.5

Table 4.3.1 shows the findings of respondents' attendance of computer courses. The respondents were asked to indicate the computer courses organized by the Ministry of Education or Teacher Education Division, which they have attended before and they may tick more than one course. The analysis reveals that majority of the respondents (53.9%) claimed that they have attended in-house training held by the Education District Office (*Pejabat Pelajaran Daerah*) while sixty-four of them (28.1%) have attended the Teaching and Learning Material (TLM) Courseware Application Course held by the Education Technology Division. Thirty-nine of them claimed that they have attended courses organized by schools (17.1%). Teachers' Club or Computer Club under Parent Teacher Association might also hold such courses.

Another eleven respondents (4.8%) claimed that they have attended computer courses at Teacher Training College while some of the respondents stated that they have attended courses organized by the Ministry of Education in relation to the smart teaching and learning system. Those courses include In-service Training for 14 or 12 Weeks (11%) and Induction Course Package (3.5%). Although the total percentage is not constituted to 100%, this analysis reveals that most of the teachers in smart schools have undergone various computer literacy courses to improve their computer skills in teaching and learning processes.

The respondents were asked to indicate their current level of computer skills ranging from 'fair' to 'excellent'. According to their own assessment, almost half of the respondents, 45.6% (n = 104) rated themselves as moderately competent and 27.6% (n = 63) considered their computer skills in the category of competent while 25.9% rated their computer skills as fair or basic level (n = 59). Among all the respondents, only two (0.9%) claimed that they were very competent and have excellent computer skills. Figure 4.3.1 illustrates the above findings. The result is somewhat unexpected because most teachers are showing that they are not really confident with their own computer skills even after they have attended computer literacy program at smart school.

Figure 4.3.1: Level of Respondents' Computer Skills



The next part of this section will elaborate on the results for each research question and major findings are discussed in Chapter 5.

Research Question #1: What is the level of ICT knowledge and proficiency among teachers in Smart Schools?

The first research question addressed to determine the respondents' level of computer literacy skill and ICT proficiency. In this section, the respondents were to rate their level of competency in computer software applications and skills in language programming using the given scale as follows:

No	Level of competency	Explanation
1	Not competent	Does not know how to use and operate software application
2	Moderately competent	Has basic skills and knows how to use software application
3	Competent	Has advance skills and knows how to use software application

Table 4.3.2 summarizes the overall findings of the respondents' knowledge and familiarity in various computer software applications. They have to asses their proficiency in thirteen computer software applications that are currently available and mostly included in computer literacy programs. 75.4% of the respondents claimed that they were competent in Word Processor while 23.3% rated themselves as moderately competent and only 1.3% was not competent in using this software. 57.9% claimed that they were moderately competent in spreadsheets, 32% rated themselves as competent and 10.1% claimed that they were not competent in using Microsoft Excel. In graphics and presentations software, only 10.1% have no competency on how to operate it, 50% claimed that they have basic skills and know how to use them while 39.9% claimed that they have competency and know how to use these software applications particularly Microsoft Powerpoint.

44.7% of the respondents claimed that they have no competency on how to use graphic and design application while 43% have basic skill on it and 12.3% rated themselves as good in Photoshop design. In using multimedia peripherals such as digital camera and

video, only 18% have good knowledge on it, 44.3% have an average knowledge while 37.7% have no competent in using the multimedia peripherals. The study also found that only 4.8% respondents were good in database, 39% knew a little about it but majority of the respondents (56.1%) was unfamiliar with Database. Most of the respondents (76.3%) were not competent in using Computer Aided Instruction while 21.1% have basic skill of using AutoCAD and only 2.6% claimed to be competent in this software application. In dealing with statistical and data analysis application e.g. SPSS, 55.3% were unfamiliar with the application, 36.4% have little knowledge on it and only 8.3% claimed to be good in it.

Table 4.3.2: Level of Respondents' Competency in Using Software Applications

The Level of Competency of Computer Skills	Not competent	Moderately competent	Competent
The Level of Competency of Using Software Application:	%	%	%
a. Word Processor - Microsoft Word	1.3	23.2	75.4
b. Spreadsheets - Microsoft Excel	10.1	57.9	32.0
c. Graphics and presentations - Microsoft Powerpoint	10.1	50.0	39.9
d. Searching information / Internet Explorer -Google, Yahoo	11.8	32.5	55.7
e. Graphic and design – Photoshop	44.7	43.0	12.3
f. Multimedia peripherals – digital camera, video	37.7	44.3	18.0
g. Databases - Microsoft Access, DBASE	56.1	39.0	4.8
h. Computer Aided Instruction - AutoCAD	76.3	21.1	2.6
i. Online discussions in newsgroups - cikgu.net	36.4	40.8	22.8
j. E-mail - Yahoo mail, MSN hotmail	22.4	33.3	44.3
k. Statistical analysis – SAS, SPSS	55.3	36.4	8.3
l. Downloading files from remote sources	20.6	35.5	43.9
m. Uploading files from remote sources	40.8	33.8	25.4

With regard to searching information or using Internet Explorer, 55.7% rated themselves as competent, 32.5% have little knowledge and another 11.8% were not familiar in using Google or Yahoo search engine. 22.8% were competent and have good knowledge in using Internet through online discussions in newsgroups (e.g. www.cikgu.net.com), 40.8% were moderately competent while 36.4% were not competent at all. 44.3% of the respondents claimed to be good in using e-mail mainly through Yahoo Mail and MSN Hotmail, 33.3% have little knowledge about it while another 22.4% were not competent. A majority of the respondents were familiar in downloading files from remote sources whereby 43.9% have good knowledge on it as compared to 25.4% who have only good knowledge on how to upload files from remote sources.

It can be concluded that the respondents' level of software applications with regards to Word Processor, Spreadsheets, Graphics and Presentations as well as Internet Explorer were among the most average competent compared to other applications. It was found that most of the respondents have little knowledge on graphic and design, multimedia peripherals and knowledge on Internet operations such as e-mail, online discussions and download files from remote sources. This study found that more than half of the total respondents were unfamiliar in Database, Computer Aided Instruction and data analysis tools such as SPSS. This is not a rare finding since these particular software applications are not frequently and necessarily used in teaching and learning processes in the classrooms.

Table 4.3.3 shows the findings of the respondents' knowledge on programming languages. Unfortunately, this study found that majority of the respondents rated them as not competent in using those programming languages whereby more than half of the respondents did not know how to operate them. 81.6% rated themselves as not competent

in C Language, 85.1% not competent in Java Language, 68.4% not competent in HTML Language and 78.1% not competent in Visual Basic.

Table 4.3.3: Level of Respondents' Competency in Using Language Programmings

The Level of Competency of Computer Skills	Not competent	Moderately competent	Competent
The Level of Competency of Using Language Programming:	%	%	%
a. C Language	81.6	17.1	1.3
b. Java Language	85.1	13.6	1.3
c. HTML Language (Homepage design)	68.4	27.2	4.4
d. Visual Basic	78.1	19.3	2.6

Among all programs, as shown in the above table, most of the respondents were good in homepage design with 4.4% was rated as competent and 27.2% was moderately competent. One major reason would be due to the success of several courses and training in building homepage held by the Ministry of Education for teachers in order to encourage the websharing programs with other countries. This followed by Visual Basic (19.3% moderately competent and 2.6% competent), C Language (17.1% moderately competent and 1.3% competent) and Java Language (13.6% moderately competent and 1.3% competent). In addition, these programming languages would give an advantage to those teachers who are familiar with them.

The respondents' competency in using Microsoft Words, Powerpoint, Homepage construction software, multimedia building software and sending e-mail were studied as well as the ability to operate the software based on their knowledge of Microsoft Excell, dBase and SPSS. The overall results as shown in Table 4.3.4 reveal that out of 228 respondents, 29.6% were competent, 37.8% were moderately competent and familiar with the computer software applications while 32.6% were not competent. Furthermore, their competencies in using language programmings have shown that only 2.4% of the

respondents were competent, 19.3% were moderately competent and most of them, 78.3% were not competent in operating these programmes.

Table 4.3.4: Level of Respondents' Competency in Computer Literacy

The Level of Competency of Computer Skills and Knowledge of ICT	Not competent	Moderately competent	Competent
	%	%	%
Competency in Using Software Applications	32.6	37.8	29.6
Competency in Using Language Programmings	78.3	19.3	2.4
COMPETENCY AVERAGE	55.5	28.5	16.0

On the whole, this study found that 16% of the respondents are competent while 28.5% of the respondents are moderately competent in software application and programming languages. These two groups of respondents constituted only 44.5% of almost competent respondents. It can be inferred that most of the respondents were familiar with the computer and its peripherals after they have attended at least once computer courses organized by the Ministry of Education. However, the remaining 55.5% of not competent respondents were considered as do not know how to use and operate the software application and language programming. This result is quite disheartening and should not be present in the smart school environment since most teachers have been exposed to the various computer training and programs.

Indeed, the ability of teachers in applying various computer software programs to seek and process information need to be upgraded from time to time. Teachers are expected to know proper skills on the software application as well as information retrieval before presenting it in the classroom. Definitely, computer skills play a prominent role in all stages of retrieving and processing the information. For example, in the retrieval stage, computer skills are strongly needed in relation to the use of Internet, CD-ROMs and online services. The information retrieved would be rendered useless if it is not presented in a meaningful way to others.

4.4 Usage of Available Electronic Information Sources

Research Question #2: What types of electronic information sources do the Smart Schools teachers' use in teaching and learning processes?

In this section, the respondents' usage of electronic information sources is given special focus. This part is particularly designed to determine the level of usage for the selected types of electronic information sources that indicated by using the given scale as follows:

No	Level of usage	Indication
1	Never use	ZERO USAGE in the teaching and learning process
2	Some of the time	Usage of at least ONCE A MONTH in teaching and learning process
3	Most of the time	Usage of at least ONCE A WEEK in teaching and learning process

Table 4.4.1 shows that majority of the respondents indicated that they have never used the electronic information sources in the teaching and learning processes in school. This is clearly shown from the lower usage of Educational Television whereby 70.2% of the respondents stated that they have never used Channel 13 which was provided for Educational TV Channel in class teaching. Another 28.1% stated that they have used it at least once a month while only 1.8% stated that they have used it at least once a week. The usage patterns of Channel 50 (Discovery Channel), Channel 51 (Animal Planet) and Channel 52 (National Geographic) were almost the same whereby 71.9%, 75.4% and 70.6% of respondents have never used them respectively. Less than 30% of respondents have used them some times and less than 7% have used them most of the time.

Table 4.4.1: Usage of Astro TV Channel in Teaching and Learning Process

USAGE OF ELECTRONIC INFORMATION SOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL	Level of Usage (%)		
	Never	Some of the time	Most of the time
Types of Resources			
i. Educational TV (Channel 13)	70.2	28.1	1.8
ii. Discovery Channel (Channel 50)	71.9	22.4	5.7
iii. Animal Planet (Channel 51)	75.4	19.7	4.8
iv. National Geographic (Channel 52)	70.6	22.8	6.6

With regard on the usage of CD-ROM Interactive (CDRI) courseware supplied by the Ministry of Education, as shown in Table 4.4.2, 18% of the respondents indicated that they have used it most of the time in the teaching and learning of Science & Mathematics. 32.9% have used it some times while 49.1% stated that they have never used it in their teaching and learning process. For CDRI supplied by the Education Technology Division, only 14.5% respondents stated they have used it most of the time, 43.9% have used it some times while 41.7% respondents did not use it at all. It was the same for the CDRI supplied by the Text Book Division whereby only 10.5% respondents stated they use it most of the time, 47.8% use it some times while 41.7% respondents have not used it at all. Finally, courseware bought from the private also gave the same average pattern of the usage i.e. the CDRI provided by the Smart Education. It showed that 13.2% of the respondents have only used it at least once a week, 42.5% respondents have used it at least once a month and the remaining 44.3% respondents have never used it in the classroom.

Table 4.4.2: Usage of CD-ROM Interactive in Teaching and Learning Process

USAGE OF ELECTRONIC INFORMATION SOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL		Level of Usage (%)		
		Never	Some of the time	Most of the time
Types of Resources				
CD-ROM Interactive : Courseware supplied by the Ministry of Education	i. Teaching & Learning of Science & Mathematics in English	49.1	32.9	18.0
	ii. CD-RI supplied by the Education Technology Division	41.7	43.9	14.5
	iii. CD-RI supplied by the Text Book Division	41.7	47.8	10.5
	iv. CD-RI Smart Education	44.3	42.5	13.2
Courseware bought from the private				

Computer associated with seeking information was studied by the ability of teachers to visit web sites. In dealing with Internet sources particularly sources from World Wide Web (www), there are several items that were categorized under educational web sites, electronic reference sources, e-mail and online discussion. For the educational web sites under local educational portal, only 8.8% respondents have used www.cikgu.net.my most

of the time, 51.3% respondents use it some time while 39.9% respondents have never used it. For www.moe.edu.my, only 9.2% respondents have used it most of the time, 50.4% have used it some time and 40.4% have never used it at all. 15.4% of respondents have used it at least once a week for www.portal.com.my which seemed to be the most popular portal for teachers compared to others, 48.6% respondents have used it at least once a month while 36% have never used this portal for teaching and learning process. The overseas educational portals such as www.educationplanet.com, portal.unesco.org and www.tutor.com seemed to be the least popular portals used by the respondents whereby most of respondents have never used them in classroom. Table 4.4.3 summarizes the findings of both educational portals as follows:

Table 4.4.3: Usage of Internet in Teaching and Learning Process

USAGE OF ELECTRONIC INFORMATION SOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL		Level of Usage (%)		
		Never	Some of the time	Most of the time
Types of Resources				
Internet: World Wide Web i. Educational Web Sites	i. http://www.cikgu.net.my/	39.9	51.3	8.8
	ii. http://www.moe.edu.my/	40.4	50.4	9.2
	iii. http://www.portal.com.my	36.0	48.6	15.4
a. Local Educational Portal				
	b. Overseas Educational Portal			
	i. http://www.educationplanet.com/	77.2	20.6	2.2
	ii. http://portal.unesco.org/	81.1	17.5	1.3
	iii. http://www.tutor.com/	55.7	36.0	8.3
c. Search Engine	i. Yahoo – www.yahoo.com	20.6	44.7	34.6
	ii. Google – www.google.com	24.6	42.1	33.3
	iii. Cari – www.cari.com	45.2	36.8	18.0

Majority of the respondents, more than 80% used Yahoo and Google in searching information through www.yahoo.com and www.google.com search engines, only 20.6% and 24.6% respectively have never used them in teaching and learning process. However, the Cari search engine. i.e. www.cari.com was not as popular as both of the above

because only 18% respondents have used it most of the time, 36.8% respondents used it some times while 45.2% have never used it at all.

Table 4.4.4: Usage of Electronic References Sources in Teaching and Learning

USAGE OF ELECTRONIC INFORMATION SOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL	Level of Usage (%)		
	Never	Some of the time	Most of the time
Types of Resources			
i. Electronic Dictionary	64.0	29.8	6.1
ii. Electronic News	53.1	35.5	11.4
iii. Electronic Encyclopedia	64.5	29.4	6.1

Table 4.4.4 shows that a majority of the respondents have never used the electronic reference sources in the classroom. 64% respondents stated that they have never used an electronic dictionary, 53.1% respondents stated that they have never used the electronic news and 64.5% respondents stated that they have never used the electronic encyclopedia. Only few percentages of respondents use these electronic dictionary, electronic news and electronic encyclopedia most of the time with 6.1%, 11.4% and 6.1% respectively.

Finally, the respondents were to state the usage of e-mail and online discussion as their electronic information sources. 27.2% respondents stated that they have used most of the time the e-mail services such as yahoo and hotmail, 34.6% respondents used them some times while only 38.2% respondents have never used e-mail as part of their information sources in teaching and learning process. Chatting room and online forum / discussion have poor usage rate among the respondents whereby only 5.7% of them used both of the sources most of the time, 23.2% of respondents used the chatting room some times while 18.9% have some times used online forum. The remaining 71.1% of respondents stated that they have never used the chatting room at all and 75.4% of respondents did not use the online forum to share or discuss any information with their other colleagues.

Table 4.4.5 shows the respondents' usage of e-mail and online discussion in the teaching and learning process.

Table 4.4.5: Usage of E-mail and Online Discussion in Teaching and Learning

USAGE OF ELECTRONIC INFORMATION SOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL	Level of Usage (%)		
	Never	Some of the time	Most of the time
Types of Resources			
i. E-mail (e.g.: Yahoo mail, MSN hotmail)	38.2	34.6	27.2
ii. Chatting room	71.1	23.2	5.7
iii. Online forum and discussion	75.4	18.9	5.7

The analysis clearly shows that some of the teachers used the Internet as their teachings aids but not in a regular basis since there is still lack of usage of Internet in the teaching and learning processes. Only few teachers, not more than 35% used the Internet sources at least once a week in their classrooms, but those items are mostly search engines and e-mail services. Majority of the teachers' browse Yahoo.com as the most popular search engine some times and most of the times. It has been used by 79.3% of respondents while Google.com was the next in popularity among the respondents (75.4%) followed by Cari.com (54.8%). Other search engines named by the respondents included Infoseek, Webcrawler, Lycos and Excite. This result is quite disheartening since there are many teachers ranging from 30% to 80%, who have never used the Internet especially educational portal, electronic reference sources and online discussion in the teaching and learning processes.

When requested to name three personal web sites which were most frequently visited by them, most of the respondents left it blank. In fact, only 10 respondents could give few web sites such as altavista.com, myschool.net.ppk, skali.com, ask.com, mypendidik.net, dogpile.com and funbrain.com. It is found that most of the respondents who used the Internet exploited the e-mail function but relatively small percentage of the respondents accessed e-mail every day for educational purposes.

Research Question #3: To what extent do teachers utilise electronic information sources in teaching and learning processes?

The findings as in Table 4.4.6 shows a total of 54.1% respondents clarified that they have never used the electronic information sources in the teaching and learning processes. This result shows that majority of the teachers in smart schools was unlikely to use these sources in their teaching classrooms. Only 34% of them stated that they have used these sources some times, which means the usage is only once a month while the other 11.9% stated that they have used it at least once a week in the teaching and learning processes. Table 4.4.6 summarizes the findings that show the mean average of respondents' usage for those electronic information sources in teaching and learning processes.

Table 4.4.6: Average of Respondents' Usage of Electronic Information Sources

USAGE OF ELECTRONIC INFORMATION SOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL		Never	Some of the time	Most of the time
Types of Resources		(%)	(%)	(%)
Educational Television	Astro TV Channels	72.0	23.3	4.7
CD-ROM Interactive :	Courseware supplied by the Ministry of Education and bought from the private supplier	44.2	41.8	14.1
Internet: World Wide Web i. Educational Web Sites	a. Local Educational Portal	38.8	50.1	11.1
	b. Overseas Educational Portal	71.3	24.7	3.9
	c. Search Engines	30.1	41.2	28.6
	Usage Average of Web Sites	46.7	38.7	14.6
ii. Electronic Reference Sources	i. Electronic Dictionary ii. Electronic News iii. Electronic Encyclopedia	60.5	31.6	7.9
iii. E-mail and Online Discussion	i. E-mail (e.g.: yahoo, hotmail) ii. Chatting room iii. Online forum and discussion	61.6	25.6	12.9
USAGE AVERAGE		54.1	34.0	11.9

This analysis clearly revealed that most of the teachers have not consistently used the electronic information sources in teaching and learning processes at the smart schools. The patterns of the usage for the educational TV particularly Channel 13, Channel 50 (Discovery Channel), Channel 51 (Animal Planet) and Channel 52 (National Geographic) indicated that these Channels are the most unpreferable sources of information being used by teachers in many schools. As expected, it is shown by the average mean usage of Educational Astro Channels whereby 72% of the respondents stated that they have zero usage on them. 23.3% stated that they have used them at least once a month while only 4.7% stated that they have used at least once a week.

The usage patterns of CD-ROM Interactive (CDRI) especially courseware supplied by the Ministry of Education and bought from the private supplier shows that 44.2% respondents indicated that they have never used the courseware for teaching. 41.8% of respondents claimed that they have used the courseware at least once a week while only 14.1% have used them most of the time in the teaching and learning processes. Similarly, the usage of the educational web sites for the local and overseas' educational portals as well as search engines also shows the lower pattern. An average of 47.6% respondents has never used them, 38.7% used them once a month and only 14.6% used them once a week in teaching classrooms.

The analysis shows that a majority of the respondents have never used the electronic reference sources in the classroom too. Only 7.9% of respondents have used these electronic dictionary, electronic news and electronic encyclopedia most of the time, 31.6% have used some times while 60.5% have never used these kinds of sources. The respondents' usage of e-mail, chatting room, forum and online discussion in the teaching and learning process also shows smaller percentages of 12.9% who used them once a week, 25.6% used them once a month while 61.6% have zero usage on them.

4.5 Teachers' Perception towards Information Literacy and Computer Skill

The respondents were asked a series of questions designed towards their perceptions of the students' knowledge and usage of ICT in the classroom. They were provided with a total of fifteen statements to complete a five point Likert scale. The mean score for each statement ranked from least positive to most positive response as follows:

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1	2	3	4	5

To analyze the perception, the researcher has focused on those respondents who stated they 'agree' and 'strongly agree' with the statements given in the questionnaire, both are considered "agree" and the percentages are combined together as shown in Table 4.5.1.

Table 4.5.1: Teachers' Perception on Students' Information and Computer Skill

STATEMENTS	Mean	Std. Dev.	% of agree & strongly agree
My students are very interested in the recent developments of ICT	4.17	.635	89.5
My students are interested in venturing into the various knowledge through electronic information sources.	4.04	.713	82.0
My students have good ICT skills.	3.73	.772	74.1
My students often complete project work given by referring to the supplement information accessed through the Internet.	3.50	.917	56.1
My students often obtain information through interactive CD-ROMs provided by the Ministry of Education.	3.33	.892	48.6
My students often look for information by browsing the Utusan education portal and bestari.net.	3.32	.904	43.4
My students are able to access information through electronic reference sources such as dictionary, bibliography and encyclopedia.	3.31	.842	43.0
My students often get information on current news through electronic materials like utusan.com.my, bharian.com.my, etc	3.30	.828	44.7
My students always share information with friends from other schools through e-mail.	3.24	.924	39.9
My students have the skills of setting up a personal website.	3.01	.939	30.7
My students obtain a lot of information through digital libraries local and overseas.	2.85	.859	18.8
My students often send given exercises through e-mail.	2.17	.876	9.6

Research Question #4: What are the teachers' perceptions on the impact of using the electronic information sources on the student information skills?

The respondents were asked to rate a number of statements regarding the teachers' perception towards information literacy and computer skill among their students. Majority of the respondents rated the three statements below as agreed and this showed that they were highly aware of the students' interest in computer literacy. 89.5% respondents perceived their students are very interested in the recent developments of ICT, 82% respondents perceived their students are interested into venturing the various knowledge through electronic information sources while 74.1% respondents perceived their students have good ICT skills. Based on the statements given, the tendencies are more towards agreement because all students in smart schools have been exposed to the computer literacy since its implementation in 1999.

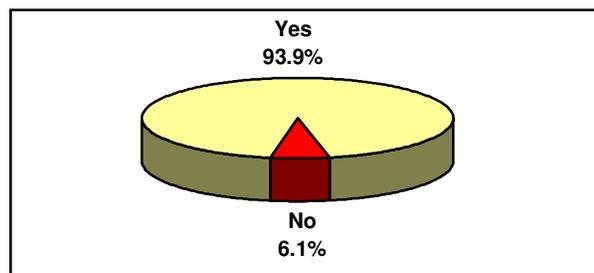
About 40% to 60% respondents agreed for the statements about the impact of the electronic information sources on students' information skills. This implies that the respondents do not perceive a highly positive response on the impact of using electronic information sources among their students in the classrooms. 56.1% respondents perceived their students often complete project work given by referring to information accessed through the Internet, 48.6% respondents perceived their students often obtain information through interactive CD-ROMs provided by the Ministry of Education and 43.4% of them believed their students often look for information by browsing educational portals. 43% of the respondents perceived their students are able to access information through electronic reference sources and 44.7% of them perceived their students often get information on current news through electronic materials.

The following statements were rated agreed by less than 40% of the respondents. 39.9% respondent perceived their students to share information with friends from other schools through e-mails, 30.7% respondents believed that their students have the skills of setting up a personal website. Only 18.8% of them thought their students obtain a lot of information through digital libraries local and overseas while another 9.6% of them perceived their students often send the given exercises through e-mail. This implies that the students' computing skills are not that encouraging as most of them are unable to apply their ICT knowledge in using various electronic information sources and services.

Research Question #5: What are the teachers' perceptions on the need of developing a digital school resource center?

The respondents were given one definition of “**School Resource Center Digital Era**” that is an electronic resource center with the collection managed by the automation resource center system stressing on accessing varieties of information through networking. They were asked whether they agreed their School Resource Center being set up according to online basis or not. As portrayed in Figure 4.5.1, almost all respondents (n = 214) agreed with this suggestion when 93.9% of them gave an answer as “**YES**” while another 6.1% (n = 14) gave their answer as “**NO**”.

Figure 4.5.1: Respondents' Agreement towards a Digital SRC



The respondents were asked to comment on the changes that they would like to see in the development of digital school resource center, or the way they made available. They were also asked to write down their suggestions to increase the usage of Resource Center as well as preparation towards the setting up of Digital School Resource Center in the future. A total of 103 respondents (45.2%) gave their response while another 125 of them (54.8%) did not answer this question. All the respondents' suggestions are attached in the Appendix F and several points raised by the respondents are as follow:

- a. Students and teachers should be given more training in ICT literacy in order to upgrade the usage of electronic information sources and services among them particularly in using information skills in library.
- b. Teachers definitely require more guidance at using those electronic information sources in the libraries and classrooms context.
- c. The schools must have adequate and appropriate ICT infrastructure to be utilized by students and teachers in teaching and learning processes.
- d. The formal and flexible time table should be provided in the use of library hours in the School Resource Center and should be included in the schedules of the classes.

Based on the given suggestions, the respondents have mainly concerned on several aspects particularly on more training of teachers and students, sufficient infrastructure, adequate resources and also flexible teaching hours in using those electronic information sources in School Resource Centers.

The respondents were also asked to rate a number of statements regarding teachers' opinion on preparation towards the setting up of a digital school resource center in school. Similarly, the researcher has focused on those respondents who stated they 'agree' and 'strongly agree' with the statements given in the questionnaire, both are considered "agree" and the percentages are summed up as shown in Table 4.5.2.

Table 4.5.2: Teachers' Opinion on Preparation towards the Setting up of a Digital School Resource Center

STATEMENTS	Mean	Std. Dev.	% of agree & strongly agree
Teacher should always aware of the changes in technology and more prepared in equipping themselves with ICT skills.	4.36	.508	98.7
Teacher can use the electronic information sources in innovatively, creatively and effectively in order to attract students attention / interest.	4.28	.523	96.5
School Resource Center needs to have a networking and links with other schools.	4.27	.568	93.8
Teacher accessed a lot of additional / supplement information on subjects that they are teaching through Internet by browsing the educational portal.	4.23	.589	93.4
Teacher should always share education information with different parties through networking and web sharing.	4.13	.579	91.7
Teacher often uses search engine like Yahoo and Google to find out supplement information in teaching.	4.17	.703	89.9
Teachers' role is very vital in setting up their own Digital School Resource Center in school.	4.12	.643	89.0
Teacher has to work hand in hand / cooperate with students in setting up the Digital Resource Center in school.	4.11	.635	89.1
Teacher often uses CD-ROM Interactive provided by the Ministry during the teaching and learning process.	3.93	.855	79.0
Teacher is able / could give related notes to students through e-mail.	3.76	.908	71.0
Teacher has access in using video conferencing facilities in teaching and learning process.	3.74	.875	66.2
Teacher is ready to build his / her own web site to load teaching information.	3.70	.839	65.8
Teacher often exchange views with colleagues through online discussion or chatting room.	3.65	.870	61.9

Based on the above table, it can be seen that almost all teachers agree with the first five statements with more than 90% of respondents agree that they have awareness and be prepared for the technology changes. The teachers also believed that they could attract the students' attention if they used the electronic information sources creatively especially when the SRC are linked to school network and they have good response in accessing to Internet and educational portals. More than 80% of respondents agree with the statements regarding the concept of establishing and cooperating with students in setting up of Digital School Resource Centers.

However, the respondents have not given highly positive response for the last four statements regarding the technical aspect of using the electronic information sources in their teaching and learning process. About 60% to 79% of the respondents agreed to use CD-ROMs, e-mail services, video conferencing, web sites building and also forum discussion through Internet. It is clearly shown that the perception of usage for those sources among teachers can be considered as low response rate.

4.6 Barriers Encountered by the Teachers when Using Electronic Information Sources in Teaching and Learning Process

Research Question #6: What are the barriers in using the electronic information sources in teaching and learning processes at school?

Finally, the respondents were asked to rate eight statements pertaining to barriers encountered when using the electronic information sources in teaching and learning. The analysis also focused on those respondents who rated the statements as 'agree' and 'strongly agree' with the total percentage as shown in Table 4.6.1 as below:

Table 4.6.1: Barriers in Using Electronic Information Sources for Teachers

STATEMENTS	Mean	Std. Dev.	% of agree & strongly agree
Teacher has extra workload and too many commitments on other co-curriculum activities.	4.57	.670	94.3
Teacher needs guidance / additional courses in handling ICT equipment and e-learning precision.	4.31	.633	94.3
Deficiencies of number of computer as compared to the ratio of students.	4.29	.816	91.7
Teacher requires special lab assistance in handling computer equipment during teaching and learning process.	4.16	.840	83.8
Teacher could only manage a certain number of students in the computer lab.	3.85	1.060	72.4
Inefficiency of the wiring system and the frequent power disturbance in the computer lab.	3.73	1.072	66.3
Software learning precision provided is not précised to the needs of the curriculum nor consistent with the marking scheme.	3.64	.977	64.1
Teacher prefers to finish the syllabus with traditional teaching method.	3.64	.994	64.0

Almost all respondents (more than 90%) rated the first three statements as agreed and this clearly shows that the major barriers in using electronic information sources in schools are due to teachers' extra workload, lack of knowledge in handling ICT equipments and imbalance ratio of students with computers supplied. A majority of the respondents (94.3%) believed that most teachers have extra workload and too many commitments on other co-curriculum activities. This was considered as the major constraint that obstructs them from using the smart teaching materials in their classrooms. Another 94.3% of the teachers perceived that they need guidance and additional courses in handling ICT equipment and e-learning courseware.

A deficiency of number of computer as compared to the ratio of students is also considered barrier in using those electronic information sources. The researcher has visited every smart schools involved to do an observation and solicited information regarding the computer facilities for each schools. The details are presented in Appendix F. It is found that the sophisticated infrastructure was adequately supplied to all schools but certain schools still facing the problems of obsolete equipment due to the fact that those things were unused on regular basis and some of the items are defective.

The last few statements also showed the higher number of respondents' range between 60% - 80% stated as 'agree' and 'strongly agree'. Teachers required special lab assistance in handling computer equipment, teachers cannot manage large number of students in the computer lab, inefficiency of the wiring system and the frequent power disturbance in the computer laboratories. These barriers definitely hinder them from utilizing the usage of electronic information sources and services in schools. Another barriers include learning courseware provided do not meet the needs of the curriculum nor consistent with the marking scheme and teachers prefer to finish the syllabus with traditional teaching method.

It is noted that during negotiations for the pilot project agreement, the Ministry of Education required a one-to-one matching of courseware with curriculum specifications as the teachers insisted that anything that departed from the curriculum would not be useful in the classroom. Coursewares for Bahasa Melayu, English Language, Science and Mathematics were developed according to specifications in the national curriculum for these four subjects. However, certain curricular changes were made mid-way in the pilot phase resulting in coursewares that did not faithfully match the specifications. This so-called mismatch was one of the main excuses why some teachers did not use the Smart School courseware. Honestly, those teachers really wanted to have more time to develop and improve the online resources they were providing for their students (Ministry of Education, 2002).

4.7 Summary

Chapter 4 provides an analysis of this study's findings and information on its results. This study is designed to identify the usage of electronic information sources among teachers in Malaysian smart schools and determined the current level of teachers' ICT skill and proficiency. This study also examined what is the level of their usage on electronic information sources, what teachers perceived their students' information skill in using ICT integration in smart schools as well as to ascertain the needs of developing a digital school resource center in the future. Finally, the barriers that hinder the usage of electronic information sources among those teachers are analysed into details. Chapter 5 provides the discussion of the major findings, conclusion and recommendations for practice and further research.

CHAPTER 5

DISCUSSION OF THE FINDINGS AND RECOMMENDATIONS

5.1 Introduction

This chapter is divided into four parts and contains a discussion on the findings of the present study in comparison with the previous studies done by earlier researchers as presented in the literature review. The results and analysis of data are based on four research objectives of this study. The first part elaborates the major findings in this study and the second part discusses the implications of the study. The third part presents the study's conclusion that highlights the need for further research and finally, this chapter ends with some recommendations for future research.

5.2 Discussion of Major Findings

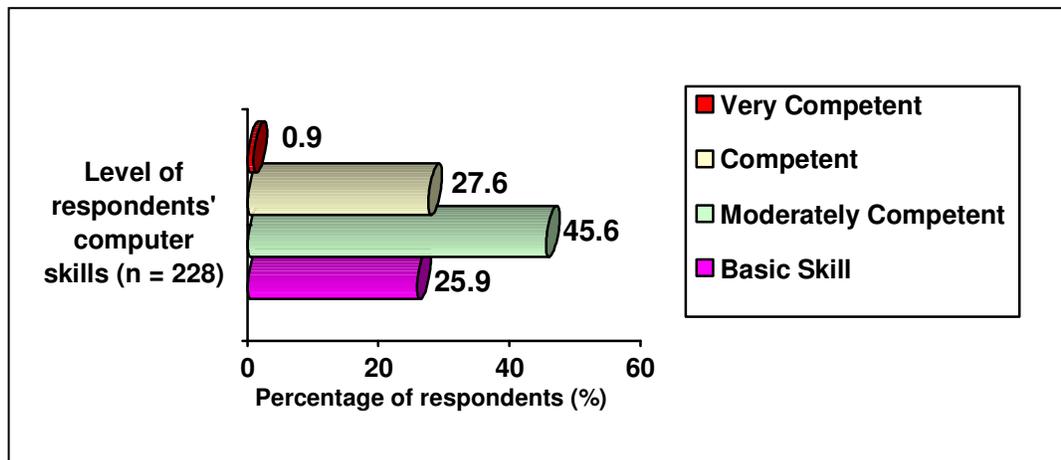
This study aimed to examine the usage of electronic information sources by teachers in Malaysian secondary smart schools in Selangor. Six research questions were developed based on four research objectives which were mainly to assess the level of competency in ICT skills and proficiency among the teachers. A special focus is given to the teacher's ICT skills and the usage of electronic information sources in the teaching and learning processes, whether these sources are fully utilized in classrooms context. This study determines the teachers' perceptions towards the need for developing a digital school resource center (SRC) and also highlights the barriers among those teachers that hinder their usage of the electronic information sources in the teaching and learning processes.

5.2.1 The Level of Computer Literacy and Proficiency among Teachers

Findings of the present study reveal that based on respondents' own assessment, the level of computer literacy and proficiency among teachers is mostly at the average. As

portrayed in Figure 5.2.1, it clearly shows that 45.6% out of 228 respondents have rated themselves as moderately competent in ICT skills. It is identified that female teachers were three-quarters of the whole respondents and thus, they dominated the results of this study. Out of 104 moderately competent, 86 were females (37.7%) and 18 were males (7.9%). Sixty-three of the respondents (27.6%) who were 45 female respondents (19.7%) were competent in ICT skills whereas only two respondents (0.9%) who were also females rated themselves as very competent. From the result, 59 respondents (25.9%) who were 48 females (21.1%) and 11 males (4.8%) stated that they have only basic level in computer skill. Nevertheless, these results were slightly different in terms of respondents' competency in using software application and language programming.

Figure 5.2.1: Respondents' Own Assessment on Their Computer Skills



This study examines the respondents' competency and familiarity in various computer software applications and programming languages. Although the respondents' level of software applications with regards to Word Processor, Spreadsheets, Graphics and presentations as well as Internet Explorer was not that high, these were among the most competent and familiar compared to other software applications. Most of the respondents have moderately competent in graphic and design, multimedia peripherals and also Internet operations such as e-mail, online discussions and downloading files from remote sources. This study finds out more than half of the total respondents were unfamiliar with

Database, Computer Aided Instruction and data analysis e.g. using SPSS in statistical analysis. As presented in Table 5.2.1, out of 228 respondents, 29.6% were competent, 37.8% were moderately competent and familiar with the computer software applications while 32.6% were not competent. Furthermore, in using language programming, it has shown that only 2.4% of the respondents were competent, 19.3% were moderately competent and most of them, 78.3% were not competent in operating these programs.

Based on the whole competency average, a majority of the teachers (55.5%) in this study are not competent in using software application and language programming while only 16% of the respondents who were mostly females were competent. Another 28.5% of the teachers have moderately competent level of ICT skills and computer literacy as shown in the Table 5.2.1 below. According to races, Malay teachers were among the most competent (25.5%) as they were majority of the respondents followed by Chinese (2.2%) and Indian teachers (1.5%).

Table 5.2.1: Level of Respondents' Competency in ICT Skills

The Level of Competency of ICT Skills and Computer Literacy	Not competent	Moderately competent	Competent
	%	%	%
Competency in Using Software Applications	32.6	37.8	29.6
Competency in Using Language Programming	78.3	19.3	2.4
COMPETENCY AVERAGE	55.5	28.5	16.0

After further cross-tabulations and analysis, it was found that a high percentage of those competent respondents were in the group age of 30 to 39 years old (45.6%) followed by the respondents in the age of 40 to 49 years old (32.2%). There were 19% of respondents below thirty years old who were competent in ICT skills while another 3.2% were respondents in the age of 50 years and above. It was also discovered that a majority of those respondents who were competent have less than five years of service, between five

to ten years and eleven to fifteen years of teaching experience with 7.8%, 8.3% and 7.3% respectively. It appeared that these three groups were among the majority of the respondents who were considered as newly fresh graduates including those who have adequate teaching experience and were probably attended the computer literacy program held by the Ministry of Education. There were, however, less than 3% of the respondents who considered their computer skills as competent have between 16 to 25 years of service while another 1.7% respondents with more than 25 years of teaching experience were also competent in ICT skills.

The above findings reveal that there are still shortages of teachers who are competent in ICT even after more than ten years of introducing the computer literacy program to all Malaysian teachers. This study seems to confirm the previous studies by Zoraini (1995) cited in Chetrilah (1998), Abd Rahim & Shamsiah (1998) cited in Suzana (2004), Siti Hawa (1998) and Rahimah (2001). Based on the overall findings, it is clearly shown that a majority of the teachers in smart schools are still not competent in ICT knowledge and skills particularly in using several software applications as well as language programming.

This study also confirms the findings of Kong and Lee (1999) and Zakiah (2000) who revealed that their respondents have a high level of understanding and knowledge on the smart school concept but still have inadequate skills in ICT and computer literacy. This result is quite disappointing when slightly over 80% of the teachers were considered incompetent in using those computers software even after they have been given training in various aspects of computer literacy and also after seven years of smart schools' implementation. To relate the teachers' competency of ICT skills, the next discussion will focus on the level of usage of electronic information sources among them.

5.2.2 The Level of Usage of Electronic Information Sources in Teaching and Learning Processes

Since late 1980's, media and technology have been introduced into schools because it is believed that they can have positive effects on teaching and learning process (Reeves, 1998). The literature review as discussed in Chapter two listed several types of electronic information sources being used in teaching and learning processes. Besides examining the respondents' ICT competency and skills, the researcher has also emphasized on the usage of four types of electronic information sources and services which have been provided to each schools as presented in Table 5.2.2. Those are educational television (ETV) including other ASTRO channels for education such as Discovery, Animal Planet and National Geographic; CD-ROM multimedia courseware or CD-ROM Interactive (CDRI) provided by the Ministry and also private suppliers; the Internet particularly World Wide Web such as educational web sites and electronic reference sources and finally, e-mail services (e.g.: yahoo, hotmail), chatting room, online forum and discussion.

It should be of substantial concern to the pattern of usage of electronic information sources in teaching and learning processes among the respondents. Surprisingly, from a sample group of secondary smart school teachers, a majority of them who have between five to fifteen years of teaching experience indicated that they have never used electronic information sources and services in the teaching and learning process. The result as summarised in Table 5.2.2 indicates that a total of 54.1% respondents have never used the electronic information sources in their teaching and learning processes. From this result, it was highly implied that majority of the teachers in smart schools, regardless of position in school or any subjects teaching, have not regularly used these electronic sources in their classrooms. Only 34% of them stated that they have used these sources some of the time, which means the usage is only once a month while the other 11.9% stated that they used it at least once a week in the teaching and learning process.

Table 5.2.2: Usage of Electronic Information Sources in Teaching and Learning Process

USAGE OF ELECTRONIC INFORMATION SOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL		Never	Some of the time	Most of the time
Types of Resources		(%)	(%)	(%)
Educational Television	Astro TV Channels	72.0	23.3	4.7
CD-ROM Interactive :	Courseware supplied by the Ministry of Education and bought from the private supplier	44.2	41.8	14.0
Internet: World Wide Web i. Educational Web Sites	a. Local Educational Portal	38.8	50.1	11.1
	b. Overseas Educational Portal	71.3	24.7	3.9
	c. Search Engines	30.1	41.2	28.6
	Usage Average of Web Sites	46.7	38.7	14.6
ii. Electronic Reference Sources	i. Electronic Dictionary ii. Electronic News iii. Electronic Encyclopedia	60.5	31.6	7.9
iii. E-mail and Online Discussion	i. E-mail (e.g.: yahoo, hotmail) ii. Chatting room iii. Online forum and discussion	61.6	25.6	12.9
USAGE AVERAGE		54.1	34.0	11.9

This study identifies that 72% respondents who were 60% females and 12% males have never used the educational television (ETV) as their teaching aids whereas only 4.7% have frequently used particularly ASTRO Channel 52, meaning that they used it at least once a week in the teaching and learning process. It was interesting to note that out of this small percentage of users, only 0.5% was teacher librarian or SRC Coordinator, 0.3% was ICT Coordinator and 3.9% were other teachers who were mostly teaching Bahasa Melayu and English Language in the upper forms classes. This pattern of ETV usage was almost the same for 23.3% respondents who have sometimes used ETV at least once in a month. Those respondents were identified as female ordinary teachers who were teaching Bahasa Melayu and English Language in the upper form classes.

It is clearly demonstrated in this present study that majority of the teachers do not utilize the Educational TV (ETV) as their teaching aid. Most of the teachers perceived that the usage of Educational TV does not give any impact to the learning due to time restriction, insufficient equipment and inappropriate on air timing. Thus, Ab. Rahman (1995) emphasized that teachers have to change their attitude to be more positive towards ETV and suggested that they should have attended in-service courses related to usage and techniques in teaching using the ETV programs.

The respondents in this study have shown the moderate usage of CD-ROM Interactive (CDRIs), which include major courseware for smart schools curriculum, where 14% of them used most of the time and 41.8% used some of the time. Data analysis demonstrated that majority of respondents who were females and competent in ICT have used CDRIs provided by the Ministry for the Science (14.4%) and Mathematics (11.3%) in both lower and upper forms classes. However, it is quite disturbing when 44.2% of respondents who have never used the CDRIs, were mostly having teaching experience between five to fifteen years. A majority of them were identified as the Head of Division (10.4%), SRC Coordinator (2.6%) and other ordinary teachers (28.9%). In this case; the Ministry of Education should progressively observe the teachers' usage from time to time.

It should be highlighted in this present study that the Internet usage as a whole is also not encouraging as 46.7% have never used the educational web sites which include local educational portals, overseas educational portals and search engines. The respondents who never used Internet in the teaching and learning were the Head of Department (1.8%), the Head of Division (12.7%), ICT Coordinator (1.2%), SRC Coordinator (2.4%) and other ordinary teachers (36.8%). As shown in Table 5.2.2, only 14.6% of the respondents used most of the time and 38.7% used some of the time.

It was discovered that slightly below 50% of mostly ordinary teachers who were teaching both lower forms and upper forms have frequently used the Internet especially in teaching core subjects like English Language (10.3%), Mathematics (10%), Bahasa Melayu (9.4%) and Science (7.3%). The electronic references sources such as electronic dictionary, electronic news and electronic encyclopedia were rarely used by the whole respondents but the usage were quite good among ICT Coordinator (1.8%) and SRC Coordinator (3.1%). The Head of Division was 6.6% and other ordinary teachers (26.6%) especially those who were teaching Bahasa Melayu (9%) and English Language (8.7%). Similarly, the pattern usage for e-mail and online discussion where the most frequent was respondents who have five to fifteen years of teaching experience. Those were identified as the Head of Division (5.5%), ICT Coordinator (1.9%), SRC Coordinator (3.3%), and other ordinary teachers (26.9%) who were teaching English Language (8.7%), Bahasa Melayu (7.6%) and other subjects such as Geography, Arts and Information Technology (8.9%).

In general, most of the teachers in smart schools showed the middle level of technology integration in their teaching and learning process. As a result, the teachers' usage of electronic information sources was not fully utilized because only a few of them had been using the particular sources on a regular basis. The above results confirm the previous studies revealed by Halimahtun and Nor Azilah (2002), Suzana (2004) and also Mohd Arif and Norsiaty (2004) that there were a poor usage of electronic information sources among Malaysian teachers in the process of teaching and learning. In addition, the report done by the Ministry of Education in The Collaboration Observation on Smart Schools Pilot Project Implementation also discovered the same situation in which the ETV, Internet and smart schools' courseware were not being used effectively. This was due to the tight usage schedule, the lesson was too short and also the problems of bureaucracy burdens of smart schools management.

5.2.3 Need for Developing a Digital School Resource Center

The concept of a Malaysian digital library is actually in line with the government's efforts in establishing Smart Schools Project. This present study reveals that the respondents showed a high level of recognition on the need for developing digital school resource center in smart schools as this receives extremely strong positive response from 214 respondents (93.9%) who were 168 (73.7%) females and 46 (20.2%) males. Only 14 respondents (6.1%) did not agree that their School Resource Center being set up according to online basis. Those respondents also listed few suggestions to increase the usage of current SRC and preparation towards setting up of Digital School Resource Center in their school (see Appendix F).

The respondents were asked about their perception towards information literacy and computer skills among their students and also their opinion on preparation towards the setting up of Digital School Resource Center in their schools. The purpose of bringing up these matters was to investigate whether those teachers who have prior experience in teaching students in smart school, were more prone to use the electronic information sources and integrate its use in their teaching. Therefore, their views on implementing digital SRC are relevant to this study whether it is really need to be developed or not. It was found that majority of the Head of Department, the Head of Division, SRC Coordinators, ICT Coordinators and ordinary teachers agreed with all the positive statements except certain parts which related to the students' ability to practically use the electronic information sources in their classroom.

The present study found that most of respondents (over 80%) have mostly agreed with the statements given in the questionnaire pertaining to their students' interests in recent development of ICT, exploring various knowledge using electronic information sources and also possessed good ICT skills. The study also considered whether teachers' familiarity

with electronic information sources and services, would encourage their students to explore these sources for their assignments, presentations and research projects. Data analysis revealed that most teachers (less than 50%) rated those statements as undecided with the mean of 3.5, although they encouraged their students to search more supplement information through the Internet, CD-RIs, educational portals and electronic reference sources. Their perception towards students' ability to access these sources was quite discouraging. A majority of the respondents showed that they disagreed with the statements (mean = 2.5) regarding their students' use of e-mail for sharing information and sending exercises, students' skills of setting up of a personal website and students' access of information through digital libraries. The proportion of disagreement was consistent regardless of the respondents' teaching experience, position in school or current teaching class. On the whole, it appeared that a majority of the respondents' students have not been using the electronic information sources and not applied the new technology in the classrooms regularly.

The respondents were asked about their opinion in preparing themselves towards setting up of a digital school resource center. Most of the respondents felt that a digital school resource center was "somewhat usefull and necessary", as such; they gave strongly positive response towards several statements regarding their awareness of changes in technology. Respondents were also asked about their usage of electronic information sources in terms of positive statements towards integrating ICT skills in education. Those statements include the use of educational portals, networking and web sharing, search engines, CDRIs provided by the Ministry of Education, e-mail services, online discussions and video conferencing in meeting their information needs for various teaching activities.

It was interesting to note that a large proportion of the respondents were mostly agreeable with all the statements given. However, the respondents have previously showed that they

were not regularly using the electronic information sources but they perceived the strong need of using those sources in the preparation of setting up a digital school resource center. This is somewhat confusing since their competency and level of usage of electronic information sources was not parallel with their perceptions. Therefore, this study solicited information about the problems faced in using all the sources in the teaching and learning process. The next discussion focuses on several barriers that considered hindering their usage of those items as revealed earlier.

5.2.4 Barriers in Using Electronic Information Sources

The respondents were also asked to rate their level of agreement for several barriers or problems that they face in using the electronic information sources in their schools based on eight statements given in the questionnaire. It can be inferred that out of those respondents, who answered this question, almost 90% of them considered extra workload and too many commitments on co-curriculum activities being a major barrier in integration of ICT in their pedagogy. This statement was also cross tabulated with certain variables in demographic factors and it is found that a majority of the respondents (65%) regardless of any position and ICT skills have strongly agreed with this statement and none of them have strongly disagreed. It was identified that respondents who strongly agreed were teaching Bahasa Melayu and Science and possessed less than fifteen years of teaching experience.

The second barrier was the need of handling ICT equipment and teaching courseware that was strongly agreed by those female teachers who were moderately competent in ICT skills. It seems that the respondents have perceived deficiencies of number of computers, which was imbalance ratio with students also being a barrier for teachers. The respondents who teach Bahasa Melayu and English were highly perceived need for lab assistants in handling computer equipment during their teaching in the laboratory.

However, there were some statements that have been rated lower agreement by the respondents. Another inference that can be made from the lower rate was due to the large number of students to be managed in the school laboratory, inefficiency of the wiring system and power disturbance in the computer lab. Software learning provided was neither imprecise nor consistent with curriculum needs and finally teachers prefer traditional teaching method to finish up the syllabus for examination purposes. Among those respondents who agreed with this statement, were mostly respondents who teach Bahasa Melayu and Science.

As determined in the literature review, lack of time was an issue for the majority of the respondents in many studies. As such, results of this present study reveal that most of the respondents indicated reason of not using the electronic information sources in the teaching and learning was due to extra workload and too many commitments in their daily tasks. This implies that the teachers in smart schools have more burden and responsibilities other than just teaching in their classrooms thus making them busy and having limited time to focus on ICT integration in their pedagogy. The respondents also agreed that there was a need for more training in using computer software and hardware in the classrooms. Again, this study confirmed the earlier study done by Siti Hawa (1998), Ray and Day (1998), Wee (1999), Robiah and Nor Sakinah (2003) who indicated that teachers claimed that limited time and lack of effective information retrieval skills seem to be the major barriers to using electronic information resources.

The other barriers that really obstruct them from using the electronic information sources as highly perceived by the respondents were imbalance ratio of computer supplied with the large number of students, teachers require lab assistants to help in handling computers and controlling many students in the computer lab. The report on smart schools

implementation (Ministry of Education, 2002) seems to reveal the similar situation and further elaborate on the factors that hinder the usage of smart room or laboratory and the supplied courseware due to the imbalance ratio of computers supplied and number of students enrolled. In addition, the report also highlighted that the implementation of smart teaching and learning concentrated more on students in Forms 1, 2 and 4 because teachers who teach Form 3 and 5 gave more emphasis to the teaching and learning that is more towards examination oriented.

In conclusion, the present study ascertains that the teachers need to develop a digital school resource center in the future because they were trained to teach in technology and ICT-based schools. However, barriers in terms of lack of time, much workload, burdens and other problems have been the hindrance in using electronic information sources. The Ministry should take further action and consideration in handling these kinds of problem. For the sake of students' benefit, teachers must be given flexible and not rigid task in their limited working hours with adequate time to prepare for ICT-based teaching method.

5.3 Implications of the Study

This study is primarily concerned on teachers' competency in computer literacy and ICT skills as well as the effective usage of electronic information sources in the teaching and learning process. It should be noted that teachers' basic skills and knowledge in ICT must be upgraded towards a higher level as well as their preparedness in integrating ICT in education particularly for teaching in the smart schools. It is essential for the teachers to develop an in-depth knowledge of learning and higher order instructional theories besides affirming their inner confidence, so they can appropriately discover new information for technology and apply ICT into their classroom context. Teacher preparedness and highly confident level were seen as important motivation for building and enhancing ICT

knowledge and practice in the smart school environment. Besides, it is essential to maintain sufficient levels of support from all the stakeholders as related to the smart school culture and the role of new technology within this culture of ICT-based schools.

In order to be efficient and effective, a number of factors are seen to be critical for ICT teacher training programs. These include incentives and support for teacher training program, adequate access to technology and on-going community partnerships through Parent Teacher Associations. Beyond the specifics of content for an ICT teacher-training curriculum, there should be enforcement in a sense that a teacher must adapt to become competent in the use of ICT for teaching tasks and keep up with recent developments in technology. ICT teacher training should therefore be considered as a continuing process with the need for continuing support from various parties. Wherever it may take place, the training should be regarded as an on-going process that must continue even after the formal course has been completed. This would mean making resources available for teachers to pursue self-directed learning at their own pace. As a result, the Government will likely to increase further investments in educational applications of the electronic information sources.

Indeed, various efforts and motivation to improve the level of computer literacy must be taken into consideration and it is necessary to understand the barriers that influence the difference in computer literacy and the usage of computer application among teachers. Instead of giving merely training and exposure in computer literacy to the teachers, they must be given enough time and flexible work load to be able to use computer as one of their teaching aids (Siti Zaiton, 1998). Flexibility of scheduling and ease of access to equipment and programs are the biggest factors promoting classroom use of electronic information sources particularly educational television and CDRIs. However, educational television has been rarely used to totally replace teachers, and television is usually used in

coordination with or to supplement the regular curriculum. This problem may well be overcome with full support and good understanding from the school management.

Specifically, the school resource center is most likely to have proper planning on the use of its resources to support and help to develop teaching and learning to be more fun, interesting, creative and attractive. The transition of school library into a digital school resource center suggests more advanced development role and provides more than just a wide range of resources and services thus making it more appropriately to be digitized in this new millennium. The successful development of the digital SRC will, however, be dependent on total support provided by the school management as well as the capabilities of the teacher librarian and other teachers. Another interesting point to note is that it was discovered by Tee and Abrizah (2005) that many school libraries today are still being managed in a “conventional” manner and do not even use a single unit of computer. There are libraries equipped with computers but do not allow students usage of the ICT facilities. In this case, teacher librarians need to gain and share experiences of managing all the available resources besides having adequate training in using the computer equipment and facilities in order to upgrade their School Resource Center in the future.

5.4 Conclusions

Definitely, computers and information literacy among teachers have been regarded and discussed as the important issues in education in Malaysia. In our effort to increase computer and information literacy among teachers, we need to understand the underlying factors that influence teachers’ computer literacy and attitude towards computers (Siti Zaiton, 1998). This study is an attempt to identify the level of usage of electronic information sources among teachers in Selangor secondary smart schools and disseminate its findings. Results from this study are not encouraging as previous studies

highlighted many teachers did not use the electronic information sources on a regular basis. It is hoped that these findings will provide meaningful and useful information for the solution of non-benefit and poor usage of those sources provided by the Ministry. The findings will serve as an indicator for teachers' effective use of ICT skills and usage of the computers for further research.

In many aspects, this study confirms the findings of earlier study or research that the teachers' integration of ICT in education is regarded as low. As many teachers considered their ICT proficiency are moderately competent, their usage of electronic information sources are also not encouraging. Indisputably, Azlina's study (1999) noted that teachers have a positive perception towards smart schools but their preparedness is regarded as low, while Jami'ah (2003) mentioned that teachers are having problems in the building of smart education even after they have been trained progressively. Similarly, Suzana (2004) confirmed both findings on earlier studies that the frequency of integration among teachers is rather low although the teachers are mostly competent in the use of technology.

More specifically, the results of this study indicate that usage of electronic information sources is relatively low and certain barriers are found as major factors which hinder the optimum usage. Some of the barriers are difficult to handle or change such as lack of time, workload burden and insufficient infrastructure. Therefore, it is unlikely to encourage the teachers to be more motivated in upgrading the usage of electronic information sources in the teaching and learning processes. It is suggested that more follow up action should be taken to counteract the current problems that exist in the smart schools. It is also apparent that a large number of teachers from the sample population are technology literate and perceived the needs of developing a digital school resource center in every smart school. The current usage of the electronic information sources in the Smart School classrooms and also school resource centers rely upon the teachers' effort to design meaningful

technology-integrated lessons. However, in many cases, it is found that even though the teachers may have had the knowledge and skills in technology, their level of integration is relatively low and thus, the teachers need to cultivate a positive attitude towards ICT and its use.

This suggests that in order to increase the level of usage of electronic information sources, we also need to develop their favourable attitude towards these sources. We need to find ways to improve this by observing, communicating and informing about the advantages and disseminating information to all students in this new millennium. Finally, more efforts need to be done to ensure the awareness on teachers regardless of their constraints such as heavy work load, deflection of hardware and time management.

This study reveals that lack of time is a major issue for the majority of the respondents in all smart schools. Those teachers wanted to have more time to develop and improve the online resources they were providing for their students. Another barrier that needs to be highlighted in the study is the dissatisfaction on the software the teachers have access to. The standard materials offer is too easy and not flexible enough. Courseware for Bahasa Melayu, English Language, Science and Mathematics was developed according to specifications in the national curriculum for these four subjects. However, certain curricular changes were made during the mid-way of the pilot phase resulting in courseware that did not faithfully match the specifications.

Although this study revealed that there is a poor usage of electronic information sources among teachers in secondary smart schools, future research is necessary to find out possible factors that may influence and improve the optimum usage of electronic information sources. Certain factors such as schools' major problems, teachers' ability and students' motivation need to be studied for the improvement of computer technology

development in all smart schools. Finally, the issue of ETV usage must be taken under consideration too since it involved the Ministry's highly investment in education. As teachers experience difficulty in previewing videos, obtaining equipment, incorporating programs into the curriculum and linking television programming to assessment activities, television viewing will continue to be relatively rare in classrooms (Reeves, 1998). To find out the best solution, another research should focus on how teachers might best use television in the classroom to enhance academic achievement. When recommendations for using television in the classroom do exist, there is little evidence that these guidelines are integral parts of the curriculum in most teacher preparation program. Researchers may also find ways of how teachers to effectively use and motivate students to attend the educational television.

5.5 Recommendations for Further Research

Further research is necessary to show what are the best ways to encourage teachers to make the most effective use of the available electronic information sources provided by the Government. Teachers must always be aware of the sources and services that are most useful for their students. An overall finding from this study suggests the following approaches to give more benefit to students and teachers:

- Information retrieval skills training to be embedded in the curriculum, undertaken at any appropriate time and support by school management to ensure the optimum use of ICT equipment and facilities provided in the smart schools.
- To ensure information skills training is pitched at a level that is appropriate to the individual needs of the students and teachers as well as to make an easy access to various knowledge and information.
- To ensure there are sufficient networked computers available for students and teachers to enhance web information sharing among them.

Since the exploratory study was conducted only in eleven smart schools in Selangor, it is recommended, if studies could be conducted in other states to get more precise results on the effectiveness of usage of electronic information sources. Besides, more efforts must be made to uncover the factors that influence the teachers' usage of electronic information sources in schools. In addition to this, more studies should be conducted to identify the challenges faced to implement the usage successfully and effectively. The Ministry of Education should encourage the use of ICT at all levels of the schools through certain enforcement, incentive or merit systems to those who use ICT in their school administrative work. This will lead to the establishment of an ICT literate community among teachers in Malaysia. Moreover, when there is a need to use ICT in school administration, teachers will have to learn how to use it.

Based on this study's findings, several recommendations are proposed to encourage continuing research in this field and changing practices in the smart schools environment:

- 5.5.1 Research is needed on both local and regional levels on the relationship between the availability and the use of a quality electronic information sources and academic achievement.
- 5.5.2 Research is needed to identify the best methods for teachers to assist their students in using electronic information sources efficiently and effectively in teaching and learning processes.
- 5.5.3 Research is needed to identify the needs of library education and information skill among secondary school students as preparation towards their life long learning. The research should focus on the area of library and information science.
- 5.5.4 A case study can be employed in carrying out the research on the usage of electronic information sources among teachers in selected smart schools. This will portray the real situation of the entire level of teacher technology integration in the teaching and learning processes.

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APPENDICES

SECTION B - COMPUTER LITERACY AND ICT SKILL AMONGST RESPONDENT

Please tick (✓) in the appropriate numbers for each of the following.

B8. Please tick any computer courses handled by the Ministry of Education / Teacher Education Division which you have attended: (Please mark all that apply)

1. In-service Training (14W / 12W)
2. Induction Course Package
3. TLM Courseware Application Course
4. Others: (Please state) _____
5. In-house Training
6. Teacher Training Course

B9. Basically, what do you think of your current level of ICT Skills / Computer Literacy?

- | | |
|-------------------------|-------------------|
| 1. Basic skill | 3. Competent |
| 2. Moderately competent | 4. Very competent |

Instruction: Please tick (✓) in the appropriate boxes to indicate the level of competency of your ICT skills and knowledge based on the scale given below:

No	Level	Explanation
1	Not competent	Does not know how to use and operate software application
2	Moderately competent	Has basic skills and knows how to use software application
3	Competent	Has competency and knows how to use software application

The Level of Competency of ICT Skills and Knowledge	Not competent	Moderately competent	Competent
B10. The Level of Competency of Using Software Application:	1	2	3
a. Word Processor - Microsoft Word, Word Pad, Word Perfect			
b. Spreadsheets - Microsoft Excel, Lotus 123			
c. Graphics and presentations - Microsoft Powerpoint, Freelance			
d. Searching information / Internet Explorer, Netscape - Google, Yahoo			
e. Graphic and design - Photoshop, Paint Shop Pro			
f. Multimedia peripherals – digital camera, video, projector			
g. Databases - Microsoft Access, DBASE			
h. Computer Aided Instruction - AutoCAD			
i. Online discussions in newsgroups - www.cikgu.net.my			
j. E-mail - Yahoo mail, MSN hotmail			
k. Statistical analysis – SAS, SPSS			
l. Downloading files from remote sources			
m. Uploading files from remote sources			

B11. The Level of Competency of Using Language Programming:	1	2	3
a. C Language			
b. Java Language			
a. HTML Language (Homepage design)			
b. Visual Basic			

SECTION C - USAGE AND AVAILABILITY OF ELECTRONIC INFORMATION RESOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL

Please tick (✓) for one choice in the appropriate boxes to indicate the level of usage of electronic information resources based on the scale given:

No	Level	Indication
1	Never use	ZERO USAGE in teaching and learning process
2	Some of the time	Use at least ONCE A MONTH in teaching and learning process
3	Most of the time	Use at least ONCE A WEEK in teaching and learning process

USAGE OF ELECTRONIC INFORMATION RESOURCES IN TEACHING AND LEARNING PROCESS AT SCHOOL		Never	Some of the time	Most of the time
Electronic Information Resources	Types of Resources	1	2	3
C12. Astro TV Channels	i. Educational TV (Channel 13)			
	ii. Discovery Channel (Channel 50)			
	iii. Animal Planet (Channel 51)			
	iv. National Geographic (Channel 52)			
C13. CD-ROM Interactive : a. Courseware supplied by the Ministry of Education b. Courseware bought from the private	i. Teaching & Learning Sciences & Mathematics in English			
	ii. CD-Rl supplied by the Education Technology Division			
	iii. CD-Rl supplied by the Text Book Division			
	iv. CD-Rl Smart Education			
C14. Internet: World Wide Web i. Educational Web Sites a. <u>Local Educational Portals</u> - Other (please state)	i. http://www.cikgu.net.my/			
	ii. http://www.moe.edu.my/			
	iii. http://www.portal.com.my			
	iv. _____			
	v. _____			
b. <u>Overseas Educational Portals</u> - Other (please state)	i. http://www.educationplanet.com/			
	ii. http://portal.unesco.org/			
	iii. http://www.tutor.com/			
	iv. _____			
	v. _____			
c. <u>Search Engines</u> - Other (please state)	i. Yahoo – www.yahoo.com			
	ii. Google – www.google.com			
	iii. Cari – www.cari.com			
	iv. _____			
	v. _____			
d. <u>Personal Web Sites</u> - Please state the url / address	i. _____			
	ii. _____			
	iii. _____			
ii. Electronic References Sources	i. Electronic Dictionary			
	ii. Electronic News			
	iii. Electronic Encyclopedia			
	iv. Other: _____			
iii. E-mail and Online Discussion	i. E-mail (e.g.: yahoo, hotmail)			
	ii. Chatting room			
	iii. Online forum and discussion			

6. If you think that it is a need to confront / face the digital era, give your opinion by circling the best option for the following statements.

D17: TEACHER'S OPINION ON PREPARATION TOWARDS THE SETTING UP OF DIGITAL SCHOOL RESOURCE CENTER IN SCHOOL.

STATEMENTS	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
a. Teacher should always aware of the changes in technology and more prepared in equipping themselves with ICT skills.	1	2	3	4	5
b. Teachers' role is very vital in setting up their own Digital School Resource Center in school.	1	2	3	4	5
c. Teacher should always share education information with different parties through Internet and sharing web.	1	2	3	4	5
d. Teacher has to work hand in hand / cooperate with students in setting up the Digital Resource Center in school.	1	2	3	4	5
e. Teacher can use the electronic resource materials in innovatively, creatively and effectively in order to attract students attention / interest.	1	2	3	4	5
f. Resource Center needs to have a networking and links between schools.	1	2	3	4	5
g. Teacher accessed a lot of additional / supplement information on subjects that they are teaching through Internet by browsing the educational portal.	1	2	3	4	5
h. Teacher is able / could give related notes to students through e-mail.	1	2	3	4	5
i. Teacher is ready to set up his / her own website to load teaching information.	1	2	3	4	5
j. Teacher often exchange views with colleagues through online discussion or chatting room.	1	2	3	4	5
k. Teacher often uses search engine like Yahoo and Google to find out supplement information in teaching.	1	2	3	4	5
l. Teacher has access in using video conferencing facilities in teaching and learning process.	1	2	3	4	5
m. Teacher often uses CD-ROM Interactive provided by the Ministry during the teaching and learning process.	1	2	3	4	5

SECTION E - INFORMATION ON BARRIERS IN USING ELECTRONIC INFORMATION RESOURCES

E18: Below are a few problems that might arise and hinder the usage of electronic information resources in your school.

STATEMENTS	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
a. Deficiencies of number of computer as compared to the ratio of students.	1	2	3	4	5
b. Inefficiency of the wiring system and the frequent power disturbance.	1	2	3	4	5
c. Courseware learning provided do not imprecise the needs of the curriculum nor consistent with the marking scheme.	1	2	3	4	5
d. Teacher needs guidance / additional courses in handling ICT equipment and e-learning courseware.	1	2	3	4	5
e. Teacher requires special assistance in handling computer equipment during teaching and learning process.	1	2	3	4	5
f. Teacher cannot control many students in the computer lab.	1	2	3	4	5
g. Teacher intends to finish the syllabus with traditional method.	1	2	3	4	5
h. Teacher has been given more burden and commitment on other co-curriculum activities.	1	2	3	4	5

Appendix B – LIST OF SECONDARY SMART SCHOOLS IN SELANGOR (JULY 2005)

NO	SCHOOL NAME & ADDRESS	PRINCIPAL	INFO. TECHNOLOGY COORDINATOR	TELEPHONE
1.	SMK (P) Sri Aman Jalan 14/49 46100 Petaling Jaya, Selangor	Pn. Alainah Hassani bt. Mohd. Nor	Pn. Marzila bt. Mohamed 019-330 5967	03-7876 5041
2.	SMK Sungai Besar 45300 Sabak Bernam Selangor	Pn. Hjh. Zuraidah bt. Mohd. Sanif	En. Ahmad Badri b. Abd. Wahid 019-376 7389	03-3224 1331
3.	SMK Bandar Baru Bangi Jalan 1/7E 43650 Bandar Baru Bangi, Selangor	Pn. Hjh. Zubedah bt. Mohd. Nor	En. Ramlan b. Abd. Aziz 019-354 0155	03-8925 0245
4.	SMK Kuala Kubu Bharu Jalan Kolam Air 44000 Kuala Kubu Bharu, Selangor	Tn. Hj. Manaf b. Jarkasi	Tn. Syed Hassan b. Syed Mohamad 013-602 2095	03-6064 1162
5.	SMK Telok Datok 42700 Banting, Selangor	En. Abdul Wahid b. Takat	En. Abd. Halim b. Abd. Wahab 013-349 4468	03-3187 1303 03-3181 3021
6.	Kolej Islam Sultan Alam Shah Peti Surat 64, 41906 Klang, Selangor	Tn. Hj. Rohmat b. Jusoh	En. Baharudin b. Mohd Shah 019-376 6367	03-3371 1658
7.	SM Agama Persekutuan Kajang Batu 13 Jalan Cheras 43000 Kajang, Selangor	Pn. Nor Hayati bt. Lebai Isa	Fadhlullah b. A. Malek 019-226 6390	03-8736 2324 ext. 110
8.	SM Sains Kuala Selangor Pejabat Pos Kuala Selangor, 45000 Kuala Selangor, Selangor	Pn. Rosida bt Mohd Zain	En. Mohamad Khairul Nizam b. Abu Hassan 013-604 2404	03-3289 3052 03-3289 1868
9.	SMK Sungai Pusu KM11, Jalan Gombak 53100 Kuala Lumpur	Pn. Hjh. Fuzi bt. Miar Ahmad	Ibrahim B. Yaacob 019-367 9872	03-6186 1701 03-6187 2276
10	SMK Putrajaya 1 4, Jalan P8 Presint 8 62250 Putrajaya	Pn. Che Manis bt. Ismail	Cik Low Shiek Li 012-339 8936	03-8888 0200
11	Sekolah Alam Shah Parcel G, Presint 1, 62250 Putrajaya	En. Khairi bin Awang	En. Mohd. Nazaruddin b. Hassan 016-293 3867	03-8888 3763
12	Sekolah Seri Puteri Persiaran Tasik 63000 Cyberjaya, Selangor	Pn. Limah bt. Ahmad	En. Ab. Aziz Mamat 012-392 8858	03-8319 2414 03- 8319 2632

Appendix C – PERMISSION LETTER FROM EPRD

**PERMISSION LETTER FROM
EDUCATIONAL PLANNING AND RESEARCH DIVISION**

Appendix D – PERMISSION LETTER FROM SED

PERMISSION LETTER FROM
SELANGOR EDUCATION DEPARTMENT

Appendix E – LIST OF COMPUTER HARDWARE IN SMART SCHOOLS (JULY 2005)

No.	HARDWARE	Sch A	Sch B	Sch C	Sch D	Sch E	Sch F	Sch G	Sch H	Sch I	Sch J	Sch K
A.	SERVER											
1.	Application Server LH3 Pentium II 450 MHz	1	1	1	1	1	1	1	1	1	1	1
2.	Database Server LH3 Pentium II 450 MHz	1	1	1	1	1	1	1	1	1	1	1
3.	Communication Server LC3 Pentium II 450 MHz HS	1	1	1	1	1	1	1	1	-	1	1
4.	HP CD-ROM Server Tower 7	-	1	1	1	1	1	1	1	1	1	1
5.	Alternate Voltage Regulator – PK	-	3	1	1	-	1	1	-	1	37	1
B.	PC & PERIPHERAL											
1.	PC - HP Vectra VEi8	81	35	34	32	37	37	36	37	3	34	79
2.	Notebook	3	1	-	2	2	2	2	1	-	2	2
3.	Color Printer	1	-	-	1	-	1	1	1	-	1	2
4.	Laser Printer	18	2	4	2	4	4	4	3	2	4	37
5.	AVR	81	37	37	35	37	37	37	37	37	37	-
6.	Scanner	1	-	1	1	1	1	1	-	1	-	-
7.	Computer table	81	-	37	37	37	37	37	37	37	37	-
8.	Computer chair	85	-	33	28	37	47	59	40	74	-	-
9.	Printer table	18	3	4	4	4	4	4	37	4	5	-
10.	Cabinet locker	2	-	1	1	1	2	2	5	4	1	-
11.	LCD Projector & screen	2	-	1	1	-	2	-	-	1	-	-
12.	Digital Camera	1	1	1	1	1	1	1	-	-	-	-
13.	CD-Rom Writer	1	-	1	1	-	1	-	1	1	-	1
14.	PCMCIA Network Card	-	-	-	37	2	2	2	37	2	2	-
15.	Accton Cheetahswitch Workgroup – 3508A	1	-	1	1	1	-	2	-	-	-	-
16.	Accton Cheetahub Power - 3512A with redundant power unit	3	-	2	-	-	1	1	-	-	-	-
17.	Accton Cheetahub Power - 3524A with redundant power unit	4	-	2	1	-	1	1	-	-	-	-
18.	UPS US9000	3	2	3	1	-	3	3	-	-	3	30
19.	Modular Hub CX2224S	-	-	1	1	-	1	1	-	-	-	-

No.	HARDWARE	Sc A	Sc B	Sc C	Sc D	Sc E	Sc F	Sc G	Sc H	Sc I	Sc J	Sc K
C.	AVAILABLE SOURCES											
1.	PC	110	137	55	30	42	60	24	100	30	35	456
2.	Notebook	18	19	26	2	32	11	40	7	14	10	21
3.	Printer	27	-	7	2	5	10	10	10	3	3	4
4.	Scanner	4	5	1	1	2	2	1	2	1	2	3
5.	Digital Camera (static)	3	1	1	1	-	3	2	2	2	-	1
6.	Digital Camera (video)	2	1	-	-	-	-	1	2	2	-	1

A	COMPULSORY APPLICATION SERVER	Sch A	Sch B	Sch C	Sch D	Sch E	Sch F	Sch G	Sch H	Sch I	Sch J	Sch K
1.	Windows NT 4.0											
2.	Windows NT 4.0 SP 4		Y									
3.	Windows NT 4.0 Option Pack 4											
4.	Microsoft Exchange Server5.5 SP 2											
5.	Mcfee Netshield											
6.	Cheyne ARCserv Windows NT											
7.	PK electronic SmartMon											
B	COMPULSORY APPLICATION FOR PC											
1.	Windows 98 Version 4.10 98		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.	Internet Explorer 5.0 Full installation		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.	MS Office 2000 Profesional		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.	Mc Afee Antivirus – Typical 4.1.2		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.	SSMS Client		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
C	SCHOOL WEB SITE											
1.	Has been developed?	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
2.	Has been updated?	N	N	Y	Y	Y	Y	N	Y	Y	N	Y
3.	Can be accessed on internet?	Y	Y	N	Y	N	N	N	N	N	N	N

Appendix F – LIST OF RESPONDENTS' SUGGESTIONS

TOWARDS SETTING UP OF DIGITAL SCHOOL RESOURCE CENTER

1. Setiap guru ada satu komputer.
2. Mengadakan kursus-kursus berkenaan ilmu komputer agar lebih ramai pelajar dan guru menjadi celik komputer.
3. Menyediakan beberapa komputer yang boleh dirangkaikan ke seluruh sekolah di Malaysia supaya pelajar dapat mengakses maklumat dengan mudah.
4. Mengadakan kursus ICT bagi guru-guru yang masih tidak tahu menggunakan komputer.
5. Sumber kewangan mesti ada - Bekalan komputer di Pusat Sumber mesti mencukupi, pelajar perlu didedahkan dengan kemahiran komputer, bekalan alatan seperti printer dan kertas perlu disediakan untuk pelajar cetak maklumat yang diperlukan.
6. Memperbanyakkan komputer dan makmal komputer, menjalankan kelas kemahiran maklumat dengan jadual tetap.
7. Menambah kemudahan komputer peribadi di sekolah.
8. Berikan kursus-kursus pendedahan kepada semua guru di sekolah sebagai persediaan sebelum disebarkan kepada murid-murid.
9. Sediakan cukup kemudahan komputer dan peralatan sampingan.
10. Sediakan pembantu Pusat Sumber yang berkemahiran dalam ICT.
11. Murid dan guru mesti diberi ilmu yang berkaitan atau latihan yang berkaitan terlebih dahulu.
12. Pendedahan ICT kepada semua pihak yang terbabit termasuk pengguna terutama dari luar bandar, bilangan komputer yang cukup untuk akses maklumat.
13. Meningkatkan penggunaan komputer di Pusat Sumber Sekolah bagi pelajar-pelajar.
14. Guru harus dibimbing dalam penggunaan komputer digital serta pendawaian harus ditingkatkan untuk mengelakkan gangguan.
15. Sediakan semua kemudahan dengan lengkap dan mencukupi.
16. Rangkaian komputer yang mencukupi wajib disediakan di samping memahirkan pelajar cara menggunakannya.
17. Adakan kursus pengendalian untuk guru dan murid, tambah unit komputer, perlu wujud sistem rujukan tentang cara penggunaan yang up to date / berkesan.
18. Literasi komputer harus didedahkan kepada guru-guru supaya bahan-bahan yang dibekalkan oleh KPM dapat digunakan pada tahap maksima.
19. Sediakan kemudahan asas ICT yang lengkap dan terkini, talian yang laju dan mudah capai.
20. Semua guru perlu didedahkan dengan penggunaan komputer.
21. Memberi pendedahan secukupnya kepada guru.
22. Memerlukan lebih banyak papan papar elektronik ditempatkan di tempat strategik di sekolah seperti di PSS, kantin, bilik guru, dewan perhimpunan untuk updated information terkini dengan cepat dan tepat, bangunan sekolah PSS perlu dilengkapi dengan peralatan elektronik moden terkini bagi mengikut perkembangan semasa era teknologi.
23. Sediakan suatu masa khas untuk murid-murid menggunakan PSS.

24. Sediakan petugas yang terlatih, komputer yang mencukupi, kakitangan khas untuk mengawasi murid-murid dalam PSS.
25. Guru dan pelajar perlu bersedia.
26. Boleh diakses secara remote dari luar sekolah, paling minimum pun boleh diakses di kawasan sekolah dengan teknologi wireless.
27. Kursus pendedahan untuk guru.
28. Latihan penggunaan komputer secukupnya diberikan kepada guru-guru terutamanya kursus asas komputer dan kursus latihan guna aplikasi.
29. Bahan dalam bentuk CD dibenarkan pinjam dan bawa pulang ke rumah.
30. Banyakkan tugas sekolah yang berasaskan penggunaan komputer yang optimum.
31. Kembalikan semula tugas guru seperti mana yang diajar dalam kursus diploma pendidikan KPLI supaya guru ada masa yang cukup untuk merancang P&P.
32. Guru-guru perlu diberi kemahiran terlebih dahulu.
33. Menyediakan tenaga kerja yang mahir dan mempunyai kemahiran teknikal komputer yang tinggi agar PSS dapat dikendalikan secara profesional tanpa bergantung kepada orang luar.
34. Menyediakan guru penyelaras yang mempunyai kelayakan dalam bidang berkaitan kerana mereka mempunyai ilmu, bukan hanya melantik guru-guru yang tiada pengetahuan dalam bidang ini.
35. Hardware dan software ditingkatkan.
36. Ada insentif untuk menggalakkan pelajar guna PSS selepas sekolah, ada jadual khas untuk setiap kelas dalam waktu P&P.
37. PSS digital perlu ada untuk pencarian bahan.
38. Menambah bilangan komputer.
39. Menyediakan komputer secukupnya.
40. Penambahan bilangan komputer di sekolah, sediakan sistem pendawaian yang baik, sediakan networking yang sempurna.
41. Tambah latihan dan komputer untuk guru.
42. Memberikan pelajar lebih banyak peluang untuk melayari Internet dalam waktu rehat / (prep.), pasang internet nanny/baby sitter supaya pelajar tidak dapat melayari laman web yang diharamkan.
43. Menambah bilangan komputer, ada sistem untuk kawalan penggunaan Internet.
44. Networking yang dapat berfungsi sepanjang masa, bahan-bahan terkini diedarkan kepada PSS.
45. Melantik kakitangan selain guru untuk menguruskan perjalanan urusan PSS.
46. Kemahiran guru dipertingkatkan secara keseluruhan maksudnya tidak tertumpu hanya kepada segelintir guru sahaja seperti guru Sains dan Matematik.
47. Semua maklumat disimpan dalam bentuk PDF atau e-book di mana pelajar boleh mengaksesnya di mana-mana.
48. Guru-guru diberi kursus sebagai persediaan untuk penggunaan PSS tersebut.
49. Bilangan komputer diperbanyakkan.
50. Penubuhan pusat media dalam bilik PSS, ada jaringan / network
51. Memasukkan kurikulum ICT sebagai mata pelajaran wajib dan adakan sekurang-kurangnya diajar kepada pelajar 10 jam/minggu.

52. Rangkaian network wireless, pihak sekolah perlu melanggan berbayar untuk kemudahan PSS digital.
53. Sistem keratan akhbar online dan bank soalan online (data berpusat), banyakkkan bahan soft copy, tambahan komputer berinternet.
54. Perbanyakkan bilangan komputer dan printer yang berfungsi di PSS, semua komputer perlu ada akses Internet dan online dengan SSMS.
55. Guru-guru perlu diberi pendedahan terlebih dahulu tentang teknik dan cara penggunaan PSS digital.
56. Menyediakan lebih banyak kemudahan komputer di PSS, memberi bimbingan kepada guru tentang cara pengendaliannya.
57. Reduce our workload. I have no time to access the Internet even though I have exposure and some competence in ICT skilss, provide latest version of computers because the computers in the school are obsolete.
58. Para pelajar harus mempunyai komputer yang mencukupi untuk mencari maklumat bila-bila masa sahaja tanpa batasan.
59. Perlu dilaksanakan secara berperingkat-peringkat dan terancang.
60. Kurangkan waktu mengajar dan khaskan untuk urusan peningkatan pengendalian IT guru.
61. Berikan pendedahan kepada guru dan murid tentang PSS digital.
62. Mengadakan lebih banyak komputer untuk kegunaan guru, memastikan ada pembantu teknik sepenuh masa di makmal komputer.
63. Murid harus dapat rujuk kepada past year school examination question secara online dari rumah untuk rujukan pada bila-bila masa.
64. Adakah guru mempunyai cukup masa untuk menggunakan PSS tersebut?
65. Membuat jadual penggunaan mengikut kelas dalam waktu P&P.
66. Kemahiran penggunaan komputer dan ICT sepenuhnya di kalangan pelajar dan guru hendaklah ditingkatkan ke arah pelaksanaan tersebut.
67. Tingkatkan pengetahuan guru dan murid dalam penggunaan komputer.
68. PSS perlu dinaiktaraf. Lebih baik lagi jika mempunyai networking dengan sekolah-sekolah lain.
69. Penyelaras mesti berkelayakan dan berkemahiran, PSS dibuka dari 8pg – 10mlm, kakitangan PSS mesti mencukupi, berkemahiran dan ringan tulang.
70. Pastikan setiap kelas ada sekurang-kurangnya sebuah PC yang boleh akses ke PSS elektronik, ciri-ciri utama ialah mudah akses oleh sesiapa sahaja pada setiap masa.
71. Galakkan pelajar sentiasa membuat rujukan untuk kerja kursus di PSS.
72. Bahan rujukan perlu diperbanyakkan.
73. Wujudkan networking dengan firewall yang mantap di sekolah.
74. Lebih banyak komputer, sediakan kakitangan mahir yang dapat bekerja sepanjang masa, sistem pemantauan untuk elak salah guna.
75. Pustakawan yang cekap dan mahir dan bukan sahaja duduk di kerusi dan tidak pernah/tahu membantu pengguna PSS.
76. Menyediakan lebih banyak komputer di PSS supaya murid dapat akses maklumat dengan lebih cepat dan berkesan.
77. Memastikan dahulu sistem keselamatan untuk PSS terjamin.
78. Pelajar-pelajar dibekalkan lebih banyak komputer.

79. Bilangan komputer tidak mencukupi dan perlu ditambah. Pemantauan perlu dibuat sepanjang penggunaan oleh pelajar.
80. Pendedahan tentang pentingnya PSS kepada pelajar, kursus berterusan tentang penggunaan PSSD.
81. Mengubah kaedah pembelajaran daripada tradisional kepada kaedah kajian bersumberkan elektronik, melengkapkan kemudahan dan kemahiran yang sesuai dengan matlamat penubuhan PSSD.
82. Memerlukan pengawasan yang teratur, mesti mempunyai sistem yang kemas, menyediakan kemudahan di pelbagai tempat termasuk bilik kelas dan bilik-bilik khas.
83. Data access perlu ditingkatkan, broadband connection perlu di upgrade.
84. Kos awal yang tinggi perlu kewangan, wujudkan lebih banyak station digital dan pegawai yang dapat membantu pelajar, masa yang mencukupi agar pengguna dapat akses dengan lebih berkesan, pengurusan yang lebih baik.
85. Sistem automasi yang sempurna, kelengkapan kemudahan komputer, kerani PSS mesti ada, buku-buku yang pelbagai dan banyak.
86. Lebih cekap/cepat dalam mencari bahan, perkakasan yang lebih canggih.
87. Menambahkan bilangan komputer, menempatkan kakitangan yang terlatih sebagai pembantu guru.
88. Pengurusan yang baik dapat menjadikan bebanan kerja berkurangan.
89. Pastikan networking ditingkatkan kecekapan dari masa ke semasa supaya aktiviti elektronik berjalan lancar.
90. Menyediakan seorang kakitangan khas bukan guru untuk mengendalikannya.
91. Alatan yang mencukupi.
92. Tetapkan satu waktu setiap guru untuk berada di PSS di dalam jadual persendirian.
93. Memberi kursus kepada semua guru, melengkapkan kemudahan komputer mengikut bilangan guru.
94. Guru perlu lebih berpengetahuan, jumlah komputer perlu mencukupi.
95. Pastikan komputer cukup untuk kegunaan guru dan pelajar, penyelenggaraan mestilah efisien untuk memastikan semua berjalan lancar.
96. Kemudahan mesti lengkap dengan perisian dan komputer yang cukup, sesuai dengan bilangan pelajar. Ada seorang pembantu makmal komputer yang boleh membantu guru untuk melancarkan proses P&P. Guru-guru diberi kursus atau taklimat cara-cara mendapatkan atau akses yang betul untuk bersedia sebelum proses P&P dijalankan. User-friendly – link ada printer, OHP projektor, LCD projektor.
97. Menyediakan kemudahan komputer dengan secukupnya mengikut nisbah 1:2 org.
98. Kursus untuk guru-guru, sediakan kemudahan komputer yang mencukupi.
99. Banyakkan komputer di sekolah. Penyelenggaraan komputer haruslah dipantau dari semasa ke semasa. Guru-guru dibekalkan dengan komputer dan diberi kursus intensif.
100. Lengkapkan dengan komputer.
101. Perteingkatkan pengurusan secara teknikal.
102. Perbanyakkan teknologi seperti komputer di PSS agar dapat digunakan dengan lebih meluas.
103. Guru perlu beri kerja di mana maklumat hanya diperolehi di PSS. Jika maklumat boleh didapati dari sumber lain – pelajar akan pergi ke sumber lain yang lebih cepat seperti buku rujukan untuk jimatkan masa.

